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(11) **EP 0 791 656 A2**

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.08.1997 Bulletin 1997/35

(51) Int Cl.⁶: **C12N 15/52**, C12N 9/00,
C12N 15/63, C12P 19/62,
C12P 17/08

(21) Application number: **97301066.3**

(22) Date of filing: **19.02.1997**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU NL
PT SE**
Designated Extension States:
RO

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(30) Priority: **22.02.1996 US 12050**

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(54) **Platenolide synthase gene**

(57) A DNA molecule isolated from *Streptomyces*

ambofaciens encodes the multi-functional proteins
which direct the synthesis of the polyketide platenolide.

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Description

The present invention is directed to the DNA isolated from *Streptomyces ambofaciens* responsible for encoding the multi-functional proteins which direct the synthesis of the polyketide platenolide. The present invention also is directed to use of that DNA to produce compounds exhibiting antibiotic activity based on the platenolide structure, including specifically spiramycin and spiramycin analogues and derivatives.

Spiramycin is a macrolide antibiotic useful in both veterinary and human medicine produced by *Streptomyces ambofaciens* (ATCC 15154). Spiramycin is a 16-membered cyclic lactone, platenolide, with three attached sugar residues. Spiramycin's antibiotic activity is believed to be due to its inhibition of protein synthesis by a mechanism that involves binding of the antibiotic to a ribosome. Spiramycin is structurally similar to another antibiotic, tylosin, and the biosynthetic pathways of both are known to be similar.

The biosynthesis of tylosin has been thoroughly investigated (Baltz et al., *Antimicrobial Agents and Chemotherapy*, 20(2):214-225(1981); Beckmann et al., *Genetics and Molecular Biology of Industrial Microorganisms*, (1989):176-186). Polyketides are synthesized via a common mechanistic scheme thought to be related to fatty acid synthesis. The cyclic lactone framework is prepared by a series of condensations involving small carboxylic acid residues. Modifications of the structure, such as ketoreduction, dehydration and enoylreduction, also occur during the processing. The synthesis is driven by a set of large multi-functional polypeptides, referred to as polyketide synthases.

PCT Publication WO 93/13663 describes the organization of the gene encoding the polyketide synthase of *Saccharopolyspora erythraea*. The gene is organized in modules, with each module effecting one condensation step. The precise sequence of chain growth and the processing of the growing chain is determined by the genetic information in each module. This PCT application describes an approach for synthesizing novel polyketide structures by manipulating in several ways the DNA governing the biosynthesis of the cyclic lactone framework. In order to adapt this methodology to other polyketides, however, the DNA molecules directing the biosynthetic processing must first be isolated.

The present invention is directed to the DNA sequence for the gene cluster responsible for encoding platenolide synthase, the building machinery of platenolide which is the basic building block of spiramycin. As a result, the present invention provides the information needed to synthesize novel spiramycin-related polyketides based on platenolide, arising from modifications of this DNA sequence designed to change the number and type of carboxylic acids incorporated into the growing polyketide chain and to change the kind of post-condensation processing that is conducted.

The present invention provides a DNA molecule comprising an isolated DNA sequence that encodes a platenolide synthase domain. Thus, the present invention provides the DNA molecule of SEQ ID NO:1 and DNA molecules that contain submodules thereof. The present invention also provides the products encoded by said DNA molecules, recombinant DNA expression vectors, and transformed microbial host cells. The present invention is further directed to a method of screening for new antibiotics based on the platenolide structure.

Figure 1 shows the map of the srmG region of the *S. ambofaciens* DNA. Distances in kb are shown relative to the beginning of srmG. Open reading frames (ORF) are indicated by block arrows. The srmG DNA (0-42 kb) is the platenolide PKS region. The indicia Ap, G, E, K, P, and X denote restriction sites Apal, BglII, EcoRI, KpnI, PstI and XhoI, respectively. Predicted domains for the srmG DNA are labeled as shown. ACP stands for acyl carrier protein; AT stands for acyltransferase; DH stands for dehydratase; ER stands for enoylreductase; KR stands for ketoreductase; KS stands for ketosynthase; and KS' stands for a ketosynthase-like domain in which a glutamine residue is present in the position occupied by an active site cysteine in a normal ketosynthase. KR' is a domain that resembles a ketoreductase but which is predicted to be inactive.

Figure 2 demonstrates the biosynthetic pathway for platenolide synthesis. A denotes malonyl-CoA; B denotes ethylmalonyl-CoA; P denotes methylmalonyl-CoA; C2 denotes a CoA derivative related to malonyl-CoA but of unknown structure.

Figure 3 shows the map of two clones that span the whole region of the srmG DNA.

The term polyketide defines a class of molecules produced through the successive condensation of small carboxylic acids. This diverse group includes plant flavonoids, fungal aflatoxins, and hundreds of compounds of different structures that exhibit antibacterial, antifungal, antitumor, and anthelmintic properties. Some polyketides produced by fungi and bacteria are associated with sporulation or other developmental pathways; others do not yet have an ascribed function. Some polyketides have more than one pharmacological effect. The diversity of polyketide structures reflects the wide variety of their biological properties. Many cyclized polyketides undergo glycosidation at one or more sites, and virtually all are modified during their synthesis through hydroxylation, reduction, epoxidation, etc.

A common feature of compounds in this class is that their synthesis is directed by a complex of multi-functional peptides, termed a "polyketide synthase". Molecular genetic analysis of polyketide synthase genes has revealed two distinct classes of enzymes operating for different polyketides: (a) the aromatics, which are made through an essentially iterative process; (b) the complex polyketides, which comprise several repeats of the same activities arranged in few, very large polypeptides. A common feature among complex polyketide synthase genes is that they are generally arranged in several open reading frames (ORFs), each of which contains one or more repeated units, designated mod-

ules. Each module processes one condensation step and typically requires several activities accomplished by several enzymes including acyl carrier protein (ACP), β -ketosynthase (KS), and acyltransferase (AT).

Therefore a "module" is defined as the genetic element encoding a multi-functional protein segment that is responsible for all of the distinct activities required in a single round of synthesis, i.e., one condensation step and all the β -carbonyl processing steps associated therewith. Each module encodes an ACP, a KS, and an AT activity to accomplish the condensation portion of the synthesis, and selected post-condensation activities to effect β -carbonyl processing. Each module is therefore, further characterized by the inclusion of submodules that are responsible for encoding the distinct activities of a complex polyketide synthase. A "submodule" thus is defined as the portion of the polyketide synthase DNA sequence that encodes a distinct activity, or "domain". A distinct activity or domain is commonly understood to mean that part of the polyketide synthase polypeptide necessary for a given distinct activity.

The protein segments corresponding to each module are called synthase units (SUs). Each SU is responsible for one of the fatty acid-like cycles required for completing the polyketide; it carries the elements required for the condensation process, for selecting the particular extender unit (a coenzyme A thioester of a dicarboxylate) to be incorporated, and for the extent of processing that the β -carbon will undergo. After completion of the cycle, the nascent polyketide is transferred from the ACP it occupies to the KS of the next SU utilized, where the appropriate extender unit and processing level are introduced. This process is repeated, employing a new SU for each elongation cycle, until the programmed length has been reached. As in synthesis of long chain fatty acids, the number of elongation cycles determines the length of the molecule. However, whereas fatty acid synthesis involves a single SU used iteratively, formation of complex polyketides requires participation of a different SU for each cycle, thereby ensuring that the correct molecular structure is produced. The composition of the polyketide synthase gene modules are variable. Some carry the full complement of β -ketoreductase(KR), dehydratase(DH), and enoylreductase(ER) domains, and some encode a particular domain only or lack a functional domain, although much of the sequence is preserved.

This variable composition of the modules, which correlate with the asymmetry in the synthesis of the polyketide precursor, enable a specific step to be assigned to each module. Since each enzymatic activity is involved in a single biochemical step in the pathway, loss of any one activity should affect only a single step in the synthesis. Knowledge of the correlation between the structure of the polyketide and the organization of the polyketide synthase genes enables one to produce altered genes selectively which produce a polyketide derivative with predicted structure.

Because the degree of processing appears to depend on the presence of functional domains in a particular SU, inactivation of a KR, DH, or ER will result in a polyketide less processed at a single site, but only if the altered chain thus produced can be utilized as a substrate for the subsequent synthesis steps. Thus, the inactivation of one of these domains should result in the formation of a polyketide retaining a ketone, hydroxyl, or site of unsaturation at the corresponding position. This rationale has led to the successful production of altered erythromycin derivatives from strains in which a KR or an ER domain had been inactivated.

Thus, one can engineer polyketide pathways by genetic intervention of the polyketide synthase and by adding or eliminating modification steps. Many of the enzymes involved in postpolyketide modifications do not seem to have absolute specificity for a particular structure. In addition one can also select the desired components from a library of polyketide and postpolyketide biosynthesis genes and combine them to produce novel structures.

The present invention provides, in particular, the DNA sequence encoding the polyketide synthase responsible for biosynthesis of platenolide, i.e., platenolide synthase. Platenolide itself is the foundation for spiramycin-related polyketides. The platenolide synthase DNA sequence, which defines the platenolide synthase gene cluster, directs biosynthesis of the platenolide polyketide by encoding the various distinct activities of platenolide synthase.

The gene cluster for platenolide synthase, like other polyketide biosynthetic genes whose organization has been elucidated, is characterized by the presence of several ORFs, each of which contains one or more repeated units termed modules as defined above. Each module also further includes submodules as defined above. Organization of the platenolide synthase gene cluster derived from *Streptomyces ambofaciens* is shown in Figure 1. The accompanying synthetic pathway and the specific carboxylic acid substrates that are used for each condensation reaction and the post-condensation activities of platenolide synthesis are indicated in Figure 2.

A preferred DNA molecule comprising the platenolide synthase gene cluster isolated from *Streptomyces ambofaciens* is represented by SEQ ID NO: 1. Other preferred DNA molecules of the present invention include the various ORFs of SEQ ID NO: 1 that encode individual multi-functional polypeptides. These are represented by ORF1, 350 to 14002, ORF2, 14046 to 20036, ORF3, 20110 to 31284, ORF4, 31329 to 36071, and ORF5, 36155 to 41830 all in SEQ ID NO: 1. The predicted amino acid sequences of the various peptides encoded by these sequences are shown in SEQ ID NO: 2, 3, 4, 5, and 6.

Yet other preferred DNA molecules of the present invention include the modules that encode all the activities necessary for a single round of synthesis. These are represented by starter module 392 to 3424, module 1, 3527 to 8197, module 2, 8270 to 13720, module 3, 14148 to 19730, module 4, 20215 to 24678, module 5, 24742 to 31002, module 6, 31428 to 35837, and module 7, 36257 to 41395 all in SEQ ID NO: 1. The predicted amino acid sequences of the various synthase units encoded by these modules are represented by starter SU 15 to 1025, SU1, 1060 to 2616,

and SU2, 2641 to 4457 in SEQ ID NO: 2; SU3, 35 to 1895 in SEQ ID NO: 3; SU4, 36 to 1523, and SU5, 1545 to 3631 in SEQ ID NO: 4; SU6, 34 to 1503 in SEQ ID NO: 5; SU7, 35 to 1747 all in SEQ ID NO: 6.

Still other preferred DNA molecules include the various submodules that encode the various domains of platenolide synthase. These submodules are represented by KS'(s), 392 to 1603, AT(s), 1922 to 2995, and ACP(s), 3173 to 3424 of starter module in SEQ ID NO: 1; KS1, 3527 to 4798, AT1, 5135 to 6208, KR1, 7043 to 7597, and ACP1, 7946 to 8197 of module 1 in SEQ ID NO: 1; KS2, 8270 to 9541, AT2, 9899 to 10909, DH2, 10985 to 11530, KR2, 12596 to 13153, and ACP2, 13469 to 13720 of module 2 in SEQ ID NO: 1; KS3, 14148 to 15422, AT3, 15789 to 16844, DH3, 16914 to 17510, KR3, 18612 to 19166, and ACP3, 19479 to 19730 of module 3 in SEQ ID NO: 1; KS4, 20215 to 21486, AT4, 21889 to 22872, KR4, 23638 to 24159, and ACP4, 24484 to 24678 of module 4 in SEQ ID NO: 1; KS5, 24742 to 26016, AT5, 26371 to 27381, DH5, 27442 to 27966, ER5, 28843 to 29892, KR5, 29905 to 30462, and ACP5, 30760 to 31002 of module 5 in SEQ ID NO: 1; KS6, 31428 to 32696, AT6, 33024 to 34022, KR6, 34770 to 35327, and ACP6, 35586 to 35837 of module 6 in SEQ ID NO: 1; KS7, 36257 to 37528, AT7, 37898 to 38905, KR7, 39851 to 40408, ACP7, 40658 to 40909, and TE, 41297 to 41395 of module 7 in SEQ ID NO: 1. The predicted amino acid sequences of the various domains encoded by these submodules are represented by KS'(s), 15 to 418, AT(s), 525 to 882, and ACP(s), 942 to 1025 of starter SU in SEQ ID NO: 2; KS1, 1060 to 1483, AT1, 1596 to 1953, KR1, 2232 to 2416, and ACP1, 2533 to 2616 of SU1 in SEQ ID NO: 2; KS2, 2641 to 3064, AT2, 3184 to 3520, DH2, 3546 to 3727, KR2, 4083 to 4268, and ACP2, 4374 to 4457 of SU2 in SEQ ID NO: 2; KS3, 35 to 459, AT3, 582 to 933, DH3, 957 to 1155, KR3, 1523 to 1707, and ACP3, 1812 to 1895 of SU3 in SEQ ID NO: 3; KS4, 36 to 459, AT4, 594 to 921, KS⁰⁴, 1177 to 1350, and ACP4, 1459 to 1523 of SU4 in SEQ ID NO: 4; KS5, 1545 to 1969, AT5, 2088 to 2424, DH5, 2445 to 2619, ER5, 2912 to 3261, KR5, 3266 to 3451, and ACP5, 3551 to 3631 of SU5 in SEQ ID NO: 4; KS6, 34 to 456, AT6, 566 to 898, KR6, 1148 to 1333, and ACP6, 1420 to 1503 of SU6 in SEQ ID NO: 5; KS7, 35 to 458, AT7, 582 to 917, KR7, 1233 to 1418, ACP7, 1502 to 1585, and TE, 1715 to 1747 of SU7 in SEQ ID NO: 6.

Although not wishing to be bound to any particular technical explanation, a sequence similarity exists among domain boundaries in various polyketide synthase genes. Thus, one skilled in the art is able to predict the domain boundaries of newly discovered polyketide synthase genes based on the sequence information of known polyketide synthase genes. In particular, the boundaries of submodules, domains, and open reading frames in the instant application are predicted based on sequence information disclosed in this application and the locations of the domain boundaries of the erythromycin polyketide synthase (Donadio et al., *GENE*, 111 51-60 (1992)). Furthermore, the genetic organization of the platenolide synthase gene cluster appears to correspond to the order of the reactions required to complete synthesis of platenolide. This means that the polyketide synthase DNA sequence can be manipulated to generate predictable alterations in the final platenolide product.

The DNA sequence of the platenolide synthase gene can be determined from recombinant DNA clones prepared from the DNA of *Streptomyces ambofaciens*, in particular strain ATCC 15154. The platenolide synthase gene is contained in recombinant DNA vectors pKC1080 and pKC1306 (Figure 1), which are available from the National Center for Agricultural Utilization Research, 1815 North University Street, Peoria, Illinois 61604-3999, in *E. coli* DH10B under accession numbers B-21500 for pKC1080 (deposited Sep 21, 1995) and B-21499 for pKC1306 (deposited Sep 21, 1995) respectively.

Techniques of isolating bacterial DNA are readily available and well known in the art. Any such techniques can be employed in this invention. In particular DNA from these deposited cultures can be isolated as follows. Lyophilis of *E. coli* DH10B/pKC1080 or *E. coli* DH10B/pKC1306 are plated onto L-agar (10 g tryptone, 10 g NaCl, 5 g yeast extract, and 15 g agar per liter) plates containing 100 µg/ml apramycin to obtain a single colony isolate of the strain. This colony is used to inoculate about 500 ml of L-broth (10 g tryptone, 10 g NaCl, 5 g yeast extract per liter) containing 100 µg/ml apramycin, and the resulting culture is incubated at 37°C with aeration until the cells reach stationary phase. Cosmid DNA can be obtained from the cells in accordance with procedures known in the art (see e.g., Rao et al., 1987 in *Methods in Enzymology*, 153:166).

DNA of the current invention can be sequenced using any known techniques in the art such as the dideoxynucleotide chain-termination method (Sanger, et al., *Proc. Natl. Acad. Sci.* 74:5463 (1977)) with either radioisotopic or fluorescent labels. Double-stranded, supercoiled DNA can be used directly for templates in sequence reactions with sequence-specific oligonucleotide primers. Alternatively, fragments can be used to prepare libraries of either random, overlapping sequences in the bacteriophage M13 or nested, overlapping deletions in a plasmid vector. Individual recombinant DNA subclones are then sequenced with vector-specific oligonucleotide primers. Radioactive reaction products are electrophoresed on denaturing polyacrylamide gels and analyzed by autoradiography. Fluorescently labeled reaction products are electrophoresed and analyzed on Applied Biosystems (ABI Division, Perkin Elmer, Foster City, CA 94404) model 370A and 373A or Dupont (Wilmington, DE) Genesis DNA sequencers. Sequence data are assembled and edited using Genetic Center Group (GCG, Madison, WI) programs GelAssemble and SeqEd or the ABI model 670 Inherit Sequence Analysis system and the AutoAssembler and SeqEd programs.

Polypeptides corresponding to a domain, a submodule, a module, a synthesis unit (SU), or an open reading frame can be produced by transforming a host cell such as bacteria, yeast, or eukaryotic cell-expression system with the

cDNA sequence in a recombinant DNA vector. It is well within one skilled in the art to choose among host cells and numerous recombinant DNA expression vectors to practice the instant invention. Multifunctional polypeptides of polyketide platenolide synthase can be extracted from platenolide-producing bacteria such as *Streptomyces ambofaciens* or translated in a cell-free in vitro translation system. In addition, the techniques of synthetic chemistry can be employed to synthesize some of the polypeptides mentioned above.

Procedures and techniques for isolation and purification of proteins produced in recombinant host cells are known in the art. See, for example, Roberts et al., Eur. J. Biochem. 214, 305-311, (1993) and Caffrey et al., FEBS 304, 225-228 (1992) for detailed description of polyketide synthase purification in bacteria. To achieve a homogeneous preparation of a polypeptide, proteins in the crude cell extract can be separated by size and/or charge through different columns well known in the art once or several times. In particular the crude cell extract can be applied to various cellulose columns commercially available such as DEAE-cellulose columns. Subsequently the bound proteins can be eluted and the fractions can be tested for the presence of the polyketide platenolide synthase or engineered derivative protein. Techniques for detecting the target protein are readily available in the art. Any such techniques can be employed for this invention. In particular the fractions can be analyzed on Western blot using antibodies raised against a portion or portions of such polyketide platenolide synthase proteins. The fractions containing the polyketide platenolide synthase protein can be pooled and further purified by passing through more columns well known in the art such as applying the pooled fractions to a gel filtration column. When visualized on SDS-PAGE gels homogeneous preparations contain a single band and are substantially free of other proteins.

Knowledge of the platenolide synthase DNA sequence, its genetic organization, and the activities associated with particular open reading frames, modules, and submodules of the gene enables production of novel polyketides having a predicted structure that are not otherwise available. Modifications may be made to the DNA sequence that either alter the initial carboxylic acid building block used or alter the building block added at any of the condensation steps. The platenolide synthase gene may also be modified to alter the actual number of condensation steps done, thereby changing the size of the carbon backbone. Submodules that are part of the present invention may be selectively inactivated thereby giving rise to predictable, novel polyketide structures. Modifications to portions of the DNA sequence that encode the post-condensation processing activities will alter the functional groups appearing at the various condensation sites on the carbon chain backbone.

One skilled in the art is fully familiar with the degeneracy of the genetic code. Consequently, the skilled artisan can modify the specific DNA sequences provided by this disclosure to provide proteins having the same or improved characteristics compared to those polypeptides specifically provided herein. Also, one skilled in the art can modify the DNA sequences to express an identical protein to those provided, albeit expressed at higher levels. Furthermore, one skilled in the art is familiar with means to prepare synthetically, either partially, or in whole, DNA sequences which would be useful in preparing recombinant DNA vectors or coding sequences which are encompassed by the current invention. Additionally, recombinant means for modifying the DNA sequences provided may include for example site-directed deletion or site-directed mutagenesis. These techniques are well known to those skilled in the art and require no further elaboration here. Consequently, as used herein, DNA which is isolated from natural sources, prepared synthetically or semi-synthetically, or which are modified by recombinant DNA methods, are within the scope of the present invention.

Likewise, those skilled in the art will recognize that the polypeptides of the invention may be expressed recombinantly. Alternatively, these polypeptides may be synthesized as well, either in whole or in part, by conventional known non-recombinant techniques; for example, solid-phase synthesis. Thus, the present invention should not be construed as necessarily limited to any specific vector constructions or means for production of the specific polyketide synthase molecules exemplified. These alternate means for preparing the present polypeptides are meant to be encompassed by the present invention.

Many cyclized polyketides undergo glycosidation at one or more sites. Spiramycin is a 16-membered cyclic lactone, platenolide, with three attached sugar residues. The process of converting platenolide to spiramycin is well known in the art. The present invention also provides the information needed to synthesize novel spiramycin-related polyketides based on platenolide. The principles have already been described above. In addition, any product resulting from post-transcriptional or post-translational modification in vivo or in vitro based on the DNA sequence information disclosed here are meant to be encompassed by the present invention.

The following example is provided for exemplification purposes only and is not intended to limit the scope of the invention which has been described in broad terms above.

Example 1:

Specific experimental details and results from the sequencing of platenolide synthase.

The DNA sequence of the *S. ambofaciens* platenolide synthase (srmG) gene can be obtained by sequencing inserts of recombinant DNA subclones containing contiguous or overlapping DNA segments of the region indicated in

Figure 3. All sequences representing srmG are fully contained in the overlapping cosmid clones pKC1080 and pKC1306 (Figure 3). The sequence can be obtained by subcloning and sequencing the fragments bounded by NruI sites at position 1, 0.3 kb, 8.2 kb, 14.1 kb, 20.2 kb, 29.5 kb, 31.4 kb, 41.1 kb and 42.0 kb. In order to obtain the srmG region on a single fragment, the 25.0 kb fragment bounded by the NruI site at position 1 and the SfuI site at 25.0 kb should be isolated from a partial digestion of pKC1080 with restriction enzymes NruI and SfuI. The 17.8 kb DNA fragment bounded by the SfuI sites at 25.0 kb and 42.8 kb should be isolated from a digestion of pKC1306 with the restriction enzyme SfuI. The resulting fragments should be ligated and cloned in an appropriate recombinant DNA vector. Clones containing the correct orientation of the two ligated fragments can be identified by restriction enzyme site mapping.

The principles, preferred embodiments and modes of operation of the present invention have been described in the foregoing specification. The invention which is intended to be protected herein, however, is not to be construed as limited to the particular forms disclosed, since they are to be regarded as illustrative rather than restrictive. Variations and changes may be made by those skilled in the art without departing from the spirit of the invention.

SEQUENCE LISTING

5

(1) GENERAL INFORMATION:

10

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 - (C) CITY: Indianapolis
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15

- (ii) TITLE OF INVENTION: PLATENOLIDE SYNTHASE GENE

- (iii) NUMBER OF SEQUENCES: 6

20

- (iv) CORRESPONDENCE ADDRESS:
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25

- (v) COMPUTER READABLE FORM:
 - (A) MEDIUM TYPE: Floppy disk
 - (B) COMPUTER: Macintosh
 - (C) OPERATING SYSTEM: Macintosh 7.0
 - (D) SOFTWARE: Microsoft Word 5.1

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(2) INFORMATION FOR SEQ ID NO:1:

45

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 44377 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

50

- (ii) MOLECULE TYPE: DNA (genomic)

- (ix) FEATURE:
 - (A) NAME/KEY: CDS
 - (B) LOCATION: 350..14002

55

- (ix) FEATURE:
 - (A) NAME/KEY: CDS

(B) LOCATION: 14046..20036

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 20110..31284

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 31329..36071

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 36155..41830

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

	GACCGCTCGG GGAGACCTGA CATATTCGTC GCGAAGTGGT TGTCCGCGCC GCGAGGTACT	60
20	GAAATCTTCT CCGCTCGCCC AGGACTCCGC GTGCAGGTCA CCGGAGTGCG CGACCGGCCG	120
	GGACGTCCGA GCGCCGACCC TCGCGACCTG GTGCGATGCC GTGTGGTCCC GCATGATCCC	180
	GCGCCGTCTC CCGTGACGAG AATCGGTGGA CAATCTCCGA ACTTGACACA ATTGATTGTC	240
25	GTTACCGGC CGTTCTGTG GCCCGGCAGT TCGCCCGCTG TACGCTCGGG AAGATCAAGA	300
	AAAGGCAGAA AAGCCACGCG GTGGTACGCG GAACATATGA GGGATGCAGG TGTCTGGAGA	360
	ACTCGCGATT TCCCGCAGTG ACGACCGGTC CGACGCGGTT GCCGTGGTCG GAATGGCGTG	420
30	CCGGTTTCCC GCGCCCCCGG GAATTGCCGA ATTCTGGAAA CTGCTGACCG ACGGAAGGGA	480
	CGCGATCGGC CGGGACGCCG ACGGCCCGCG GCGCGGCATG ATCGAGGCGC CCGGCGACTT	540
35	CGACGCGGCC TTCTTCGGCA TGTCACCCCG CGAGGCGGCC GAGACCGACC CCCAGCAGCG	600
	CCTGATGCTC GAACTCGGCT GGGAGGCTCT GGAGGACGCC GGCATCGTCC CCGGCTCCCT	660
	GCGCGGCGAG GCGGTCCGGG TCTTCGTCCG GGCCATGCAC GACGACTACG CCACCCTGCT	720
40	CCACCGCGCC GCGCGCCCGG TCGGCCCCCA CACCGCCACC GGCCTCCAGC GCGCCATGCT	780
	CGCCAACCGG CTCTCCTACG TCCTGGGGAC GCGCGGCCCC AGCCTCGCGG TCGACACCGC	840
45	CCAGTCGTCC TCCCTGGTCG CCGTGGCCCT CGCCGTCGAG AGCCTGCGGG CCGGCACCTC	900
	CCGCGTCGCC GTCGCCGGGG GCGTCAACCT GGTCTCGCC GACGAGGGAA CGGCCGCCAT	960
	GGAACGCCTC GCGCGCTGT CACCCGACGG CCGCTGCCAC ACCTTCGACG CCCGTGCCAA	1020
50	CGGCTATGTC CGCGGTGAGG GCGGCGCCGC CGTCGTCTTG AAGCCCCCTG CCGACGCCCT	1080
	GGCCGACGGG GACCCCGTGT ACTGCGTGGT GCGTGGCGTC GCCGTCCGCA ACGACGGCGG	1140
	CGGCCCCGGG CTGACCGCTC CCGACCGCGA GGGACAGGAG GCGGTGCTCC GGGCCGCTG	1200
55	CGCCCAGGCC CGGGTCGACC CCGCCGAGGT GCGTTTCGTC GAACTGCACG GCACGGGAAC	1260

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	CCCGGTGGGC	GACCCGGTCG	AGGCACACGC	CCTCGGCGCG	GTGCACGGCT	CCGGTCGGCC	1320
	GGCCGACGAC	CCCCTGCTGG	TGGGGTCGGT	GAAGACCAAC	ATCGGCCACC	TGGAGGGCGC	1380
5	CGCCGGCATC	GCGGGCCTGG	TCAAGGCCGC	ACTGTGCCCTG	CGGGAACGCA	CCCTTCCCGG	1440
	CTCGCTGAAC	TTCGCCACCC	CCTCTCCGGC	CATCCCGCTG	GACCAGCTCC	GGCTGAAGGT	1500
10	GCAGACCGCT	GCCGCCGAGC	TGCCGCTCGC	CCCGGGCGGC	GCACCCCTGC	TGGCGGGTGT	1560
	CAGTTCGTTC	GGCATCGGTG	GCACCAACTG	CCATGTGGTC	CTGGAACACC	TGCCCTCCCG	1620
	GCCCACCCCG	GCCGTCTCCG	TCGCCGCCTC	GCTTCCGGAC	GTCCCGCCGC	TGTTGTGTGC	1680
15	CGCCCGGTGC	GAGGGGGCGT	TCCGGGCGCA	GGCGGTGCGG	TTGGGTGAGT	ACGTGGAGCG	1740
	GGTGGGCGCG	GATCCGCGGG	ATGTGGCTTA	TTCGCTGGCT	TCGACGCGGA	CTCTTTTCGA	1800
	GCACCGTGCG	GTGGTGCCGT	GTGGTGCGCG	TGGGGAGCTC	GTCGCTGCTC	TTGGTGGGTT	1860
20	TGCTGCCGGG	AGGGTGCTCG	GGGGTGTCGG	GTCCGGGCGG	GCTGTGCCGG	GTGGGGTGGG	1920
	GGTGTGTGTC	ACGGGTCAGG	GTGCGCAGTG	GGTTGGTATG	GGGCGTGCGT	TGTATCGGGG	1980
25	GGGTGGGGTG	TTTGCGGAGG	TGCTGGATGA	GGTGTGTGTC	ATGGTGGGGG	AGGTGGATGG	2040
	TCGGTCGTTG	CGGGATGTGA	TGTTCCGGCA	CGTCGACGTG	GACGCGGGTG	CCGGGGCTGA	2100
	TGCGGGTGCC	GGTGCGGGTG	CTGGGGTCCG	TTCTGGTTCC	GGTTCTGTGG	GTGGGTGTGT	2160
30	GGGTCCGACG	GAGTTTGCTC	AGCCTGCGTT	GTTTGCGTTG	GAGGTGGCGT	TGTTCCGGGC	2220
	GTTGGAGGCT	CGGGGTGTGG	AGGTGTCCGT	GGTGTTCGGT	CATTCCGTGG	GGGAGGTGGC	2280
	TGCTGCGTAT	GTGGCGGGGG	TGTTGTCTGT	GGGTGATCGG	GTGCGGTTGG	TGGTGGCGCG	2340
35	GGGTGGGTTC	ATGGGTGGGT	TGCCCGTGGG	TGGGGGGATG	TGGTCCGTGG	GGGCGTCGGA	2400
	GTCGGTGCTG	CGGGGGGTTC	TTGAGGGGTT	GGGGGAGTGG	GTGTCCGTTC	CGGCGGTGAA	2460
40	TGGGCCGCGG	TCGGTGCTGT	TGTCGGGTGA	TGTGGGTGTG	CTGGAGTCGG	TGGTTCCTTC	2520
	GCTGATGGGG	GATGGGGTGG	AGTGCCGGCG	GTTGGATGTG	TCGCATGGGT	TTCATTCCGT	2580
	GTTGATGGAG	CCGGTGTTCG	GGGAGTTCCG	GGGGGTTCGT	GAGTCGTTGG	AGTTCCGGTCG	2640
45	GGTGCGGCCG	GGTGTGGTGG	TGGTGTCCGG	TGTGTCCGGT	GGGGTGCTGG	GTTCCGGGGG	2700
	GTTGGGGGAT	CCGGGGTATT	GGGTGCGTCA	TGCGCGGGAG	GCGGTGCGTT	TCGCGGATGG	2760
	GGTGGGGGTG	GTGCGTGGTC	TGGGTGTGGG	GACGTTGGTG	GAGGTGGGTC	CGCATGGGGT	2820
50	GCTGACGGGG	ATGGCGGGTG	AGTGCCCTGG	GGCCGGTGAT	GATGTGGTGG	TGGTGCCTGG	2880
	GATGCGGCGG	GGCCGTGCGG	AGCGGGAGGT	GTTTCGAGCGG	GCGCTGGCGA	CGGTGTTTCAC	2940
55	CCGGGACGCC	GGCCTGGACG	CCACGGCACT	CCACACCGGG	AGCACCGGCC	GGCGCATCGA	3000
	CCTCCCCACC	TACCCCTTCC	AACGCCGTAC	CCACTGGTCC	CCCGCGCTGA	GCCGGCCGGT	3060

	CACGGCCGAC	GCCGGGGCGG	GTGTGACCGC	CACCGATGCC	GTGGGGCACA	GCGTCTCCCC	3120
5	GGACCCCGAG	AGCACCAGAG	GGACGTCCCA	CAGGGACACG	GACGACGAGG	CGGACTCGGC	3180
	GTCACCGGAG	CCGATGTCCC	CCGAGGATGC	CGTCCGCCTG	GTCCCGGAGA	GCACCGCGGC	3240
	CGTCCTGGGC	CACGACGATC	CCGGCGAGGT	CGCGCTCGAC	CGCACCTTCA	CCTCCCAGGG	3300
10	CATGGACTCG	GTGACCGCGG	TCGAGCTGTG	CGACCTGCTG	AAGGGCGCCT	CGGGGCTCCC	3360
	CCTCGCCGCC	ACGCTGGTCT	ACGACCTGCC	CACCCCGCGT	GCCGTCCCGG	AGCACATCGT	3420
	GGAAGCCGCG	GGCGGGCCGA	AGGACTCGGT	TGCCGGTGGG	CCCGGAGTGC	TCTCGTCGGC	3480
15	CGCGGTAGGG	GTGTCCGACG	CCCGGGGCGG	CAGCCGGGAC	GACGACGACC	CGATCGCCAT	3540
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	CCTGCACTCG	GCGGCCGAGT	TCGACCGCGA	GTTCTTTCGGG	ATATCGCCGC	GCGAGGCCAC	3780
25	GGCCATGGAC	CCGCAGCAGC	GCTTGCTGCT	GGAAGCGTCG	TGGGAGGCCC	TCGAGGACGC	3840
	CGGAGTGCTC	CCCAGTCAAC	TGCGCGGCGG	CGACGCCGGA	GTGTTCGTTCG	GCGCCACCGC	3900
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30	CGGCACCACC	GCGAGCGTGG	CCTCCGGCCG	GATCGCCTAC	ACCCTCGGCA	CCGGCGGACC	4020
	GGCGCTCACC	GTGACACCG	CGTGCTCCTC	GTCCCTGGTG	GCGCTGCACC	TGGCCGTGCA	4080
35	GGCGCTGCGC	CGGGGCGAGT	GCGGGCTGGC	TC TGCGGGGC	GGCGCCACGG	TGATGTCGGG	4140
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40	GGAGCGGCTC	TCCGACGCCC	GGCGTGCGGG	ACACCGGGTG	CTGGGCGTGG	TGCGGGGCAG	4320
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	GGGCGTCATC	CGAGCTGCCC	TGGCCGACGC	CGGCCTCGCG	CCGGGTGACG	TGGACGCGGT	4440
45	GGAGGCGCAC	GGTACGGGGA	CGGCGCTGGG	CGATCCGATC	GAGGCGAGCG	CGCTGCTGGC	4500
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50	CGGTCACACC	CAGGCCGCCG	CGGGGGCCGC	GGGTGTGGTC	AAGATGCTGC	TTGCCCTGGA	4620
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	GTCGGGCACC	GTCGCCCTGC	TGGCAGAGGC	GCGCCGGTGG	CCCCGGCGGT	CGGACCGCCC	4740
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	GCGGTTCGAT GTGTCCATG GGTTCATTC GGTGTGATG GAGCCGGTGT TGGGGAGTT	5820
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35	GGGTGTGTG GGTGGGGTGG TGGGTTCGGG GGAGTTGGGG GATCCGGGT ATTGGGTGCG	5940
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	CGGCGCTGAC	GGTGGACACG	GCGTGTTCGT	CGTCGTGGT	GGCGTTGCAT	CTGGCGGTGC	14700
35	AGTCGTTGCG	GCGGGGTGAG	TGTGATCTGG	CGTTGGCCGG	TGGGGTGACG	GTGATGGCGA	14760
	CGCCGACGGT	GCTCGTGGAG	TTCTCGCGGC	AGCGGGGGCT	GGCGGCGGAC	GGGCGGTGCA	14820
	AGGCGTTGCG	GGAGGGTGCG	GACGGGACGG	CGTGGGCCGA	GGGTGTGGGC	GTGCTGCTGG	14880
40	TGGAGCGGCT	CTCCGACGCC	CGCCGCAATG	GCCATCGGGT	GCTGGCGGTG	GTGCGGGGCA	14940
	GTGCGGTCAA	TCAGGACGGT	GCGAGCAACG	GGCTGACGGC	GCCGAGTGGT	CCTGCCGAGC	15000
	AGCGGGTGAT	CCGTGAGGCG	CTGGCCGACG	CGGGGCTGAC	GCCCGCCGAC	GTGACGCGG	15060
45	TCGAGGCGCA	CGGCACCGGC	ACACCCCTGG	GCGACCCCAT	CGAGGCGGGT	GCGTTGCTGG	15120
	CCACCTATGG	CAGTGAGCGC	CAGGGCCAAG	GTCCGTTGTG	GTTGGGGTCG	TTGAAGTCGA	15180
50	ACATCGGSCA	TGCGCAGGCG	GCTGCGGGTG	TGGGTGGCGT	GATCAAGGTG	GTGCAGGCGA	15240
	TGCGGCATGG	GTCGTTGCCG	CGGACGCTGC	ATGTGGATGC	GCCGTCGTGC	AAGGTGGAGT	15300
	GGGCTTCGGG	TGCGGTGGAG	CTGCTGACCG	AGACCCGGTC	GTGGCCGCGG	CGGGTGGAGC	15360
55	GGGTGCGGCG	GGCCGCGGTG	TCGCGTTCG	GGGTGAGCGG	GACCAACGCC	CATGTGCTCC	15420

	TGGAGGAAGC GCCGGCGGAG GCCGGGAGCG AGCACGGGA CGGCCCTGAA CCCGAGCGGC	15480
5	CCGACCGCGT GACGGGTCCG TTGTCTGTGG TGCTTTCTGC GCGGTCCGAG GGGGCGTTGC	15540
	GGGCGCAGGC GGTGCGGTTG CGTGAGTGTG TGGAGCGGGT GGTGCGGAT CCCCGGGATG	15600
	TGGCGGGGTC GTTGGTGGTG TCGCGTGCCT CGTTCCGTGA GCGTGCGGTG GTGGTGGGCC	15660
10	GGGGCGTGA GGAGTTGCTG GCGGGTCTGG ATGTGGTGGC TGCCGGGGCT CCTGTGGGTG	15720
	TGTCCGGGGG CGTGTCTTCG GGGGCCGGTG CTGTGTGCG GGGAGTCCG GTCCGGGGTC	15780
	GTGGGTGGG GGTGTGTTC ACGGGTCAGG GTGCCAGTG GGTGGTATG GGGCGTGGGT	15840
15	TGTATGCGGG GGGTGGGGTG TTTGCGGAGG TGCTGGATGA GGTGTGTGCG GTGGTGGGGG	15900
	AGGTGGGGG TTGGTCTTG CCGGATGTGA TGTTCGGCA CGTCGACGTG GACGCGGGTG	15960
	CCGGGGCTGA TGCGGGTGTC GGTTCGGGTG TTGGTGTGGG TGGGTGTGTG GGTCCGACGG	16020
20	AGTTTGCTCA GCCTGCGTTG TTTGCGTTGG AGGTGGCGTT GTTCCGGCGG TTGGAGGCTC	16080
	GGGGTGCGA GGTGTGGTG GTGTTGGGTC ATTCGGTGGG GGAGGTGGCT GTCGCGTATG	16140
25	TGGCGGGGGT GTTGTCTTG GGTGATGCGG TGCGGTGGT GGTGCGCGG GGTGGGTGA	16200
	TGGGTGGGTT GCCGGTGGGT GGGGGGATGT GGTCCGTGGG GCGCTCGGAG TCGGTGGTGC	16260
	GGGGGGTGT TGAGGGGTG GGGAGTGGG TGTGGTTGC GCGGTGAAT GGGCCGCGGT	16320
30	CGGTGGTGT GTCCGGTGAT GTGGGTGTGC TGGAGTCGGT GGTTCCTCG CTGATGGGGG	16380
	ATGGGGTGA GTGCCGGCG TTGGATGTGT CGCATGGGTT TCATTCCGTG TTGATGGAGC	16440
	CGGTGTGGG GGAGTTCCG GGGGTGTGG AGTCGTTGA GTTCGGTCCG GTCCGGCCCG	16500
35	GTGTGGTGGT GGTGTGAGT GTGTCCGGTG GGTGGTGGG TTCGGGGAG TTGGGGGATC	16560
	CGGGGTATG GGTGCGTCAT GCGCGGGAGG CGGTGCGTTT CGCGGATGGG GTGGGGGTGG	16620
40	TGCGTGGTCT GGGTGTGGG ACGTTGGTGC AGGTGGGTCC GCATGGGGTG CTGACGGGA	16680
	TGGCGGGTGA GTGCCTGGG GCCGGTGATG ATGTGGTGGT GGTGCCGGCG ATGCGGCGGG	16740
	GCCGTGCGGA GCGGGAGGTG TTCGAGGCGG CGCTGGCGAC GGTGTTCACC CGGGACGCCG	16800
45	GCCTGGACGC CACGACACTC CACACCGGA GCACCGCGG ACGCATCGAC CTCCCCACCT	16860
	ACCCCTTCCA ACACGACCGC TACTGGCTGG CCGCCCCGTC CCGGGCCAGG ACGGACGGGC	16920
	TGTCCGCGGC GGGTCTGCGC GAGGTGGAGC ACCCCCTGCT CACCGCCGCC GTGGAAGTGC	16980
50	CCGGCACCGA CACCGAGGTG TGGACCGGCC GCATATCCGC TGCCGACCTG CCCTGGCTCG	17040
	CCGACCACCT GGTGTGGGAC CGAGGCGTGG TGCCGGGGAC CGCGCTGCTG GAGACGGTGC	17100
	TCCAGGTGGG AAGCCGATC GGTCTGCCGC GCGTCGCCGA ACTGGTCTG GAGACGCCGC	17160
55	TGACCTGGAC GTCGGACCGC CCGCTCCAGG TCCGGATCGT CGTGACCGCT GCCGCCACCG	17220

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	CCCCCGGGG	CGCGCGTGAG	CTGACCCCTCC	ACTCGCGGCC	CGAGCCCGTG	GCCGCCTCCT	17280
5	CGTCCTCCCC	GAGTCCCGCC	TCTCCCCGGC	ACCTCACGGC	GCAGGAGAGC	GACGACGACT	17340
	GGACCCGGCA	TGCCTCAGGG	CTGCTCGCCC	CGGCTGCCGG	CCTCGCCGAC	GACTTCGCCG	17400
	AGCTCACCGG	CGCCTGGCCC	CCCGTCGGCG	CCGAGCCCTT	CGACCTCGCC	GGTCAGTACC	17460
10	CGCTCTTCGC	AGCCGCCGGA	GTGCGCTACG	AAGGCGCCTT	CCGAGGGCTG	CGCGCGGCAT	17520
	GGCGTCGAGG	CGACGAGGTC	TTCGCCGACG	TACGGCTGCC	CGACGCGCAC	GCGGTCGACG	17580
15	CTGATCGTTA	CGGGGTGCAC	CCCGCCCTGC	TCGACGCGGT	GCTCCACCCG	ATCGCGTCGC	17640
	TGGACCCGCT	GGGCGACGGC	GGGCACGGTC	TGCTGCCGTT	CTCCTGGACC	GACGTACAGG	17700
	GACACGGCGC	CGGCGGACAC	GCCCTCCGGG	TACGGGTGGC	GGCCGTCGAC	GGCGGCGCGG	17760
20	TGTGCGTCAC	CGCGGCCGAC	CACGCGGGCA	ACCCGGTGTT	ATCCGCCCCG	TCCCTGGCAC	17820
	TGCGTCGTAT	CACCGCGGAC	CGGCTTCCCG	CCGCGCCCGT	CGCCCTCTC	TACCGCGTGG	17880
	ACTGGCTGCC	GTTCCCGGGT	CCGGTGCCCC	TATCCGCGGG	CGGCCGCTGG	GCGGTCGTGG	17940
25	GACCCGAGGC	CGAAGCCACG	GCTGCCGGAC	TGCGTGCGGT	GGGCCTCGAC	GTGCGTACCC	18000
	ATGCGCTCCC	CCTCGGAGAG	CCCTTGCTTC	CGCAGGCCGG	TACCGACGCG	GAGGTGATCA	18060
	TCCTCGACCT	GACCACCACC	GCAGCCGGCC	GTACGGCGTC	GGACGGGGGG	CGGCTCAGTC	18120
30	TCCTCGACGA	GGTGCGTGCG	ACGGTGCGCC	GGACCCTCGA	AGCCGTACAG	GCCCCGCTCG	18180
	CCGACACCGA	AACGGCCCCC	GACGTGACAG	TCCGTACGGC	CGCGCGCCCC	CGCACAGCCG	18240
35	CCCGTACAAG	CCCCCGCGTG	GACACCCGCA	CGGGAGCCCG	CACCGCTGAC	GGCCCCCGGC	18300
	TCGTGCTCCT	GACCCGGGGC	GCGGCCGGAC	CCGAGGGAGG	CGCGGCCGAT	CCCGCGGGTG	18360
	CCGCTGTCTG	GGGGCTCGTC	CGGGTCGCCC	AGGCCGAACA	GCCCCGCCGC	TTCACCTGG	18420
40	TGGACGTGCA	CGGCACCCAG	GCGTCGCTGC	GGGCCCTGCC	CGGTCTGCTG	GCCACGGATG	18480
	CCGGCCAGTC	GGCCGTGCGC	GACGGAAGTG	TCACCGTCCC	GCGCCTCGTC	CCGGTGGCCG	18540
	ACCCCGTCCC	CCACGGCGGC	GGCACGGGG	CCGACGGGAC	GGGTGCCGGC	GAGCCGTCCG	18600
45	CGACCCTGGA	CCCCGAAGGC	ACCGTGCTGA	TCACCGCGCG	CACCGGAGCA	CTGGCCGCGG	18660
	3AAACCGCCCG	GCACCTGGTC	GACCGGCACA	AGGTGCGCCA	TCTCCTGCTG	GTGGGCAGGC	18720
	GCGGTCCCCA	CGCACCCGGC	GTCGATCGAC	TGGTCGCCGA	GTTGACCGAG	TCGGGTGCCG	18780
50	AGGTGCGCCGT	ACGGGCCTGT	GACGTCAAGG	ACCGCGACGC	CCTGCGCCGC	CTGCTCGACG	18840
	CACTCCCCGA	CGAACACCCG	CTGACCTGGG	TGGTGACAC	CGCCGGGGTG	CTCGACGACG	18900
55	GCGTGCTCTC	CGCCCAGACG	GCCGAGCGGA	TCGACACGGT	GCTCCGGCCC	AAGGCCGACG	18960

	C	C	T	G	A	C	C	G	G	G	A	G	A	G	T	G	T	G	T	A	C	T		19020	
	C	C	T	C	G	G	T	C	T	C	G	G	C	A	C	C	C	T	G	G	C	A	C		19080
5	T	C	A	T	G	G	A	C	G	C	G	C	C	G	G	C	C	G	G	C	A	C		19140	
	G	G	G	G	C	T	G	G	T	G	G	T	G	G	C	C	G	G	G	T	G	G		19200	
10	T	C	A	G	G	C	G	C	T	C	G	C	C	C	G	C	C	G	C	C	G	G		19260	
	C	G	C	T	G	A	C	C	C	G	G	C	C	G	G	C	C	G	C	C	G	C		19320	
	G	T	G	C	C	A	C	C	G	G	A	G	T	G	C	C	G	C	C	G	C	C		19380	
15	G	C	A	C	G	C	C	C	G	G	C	C	G	G	C	C	G	C	C	G	C	C		19440	
	C	C	C	C	G	C	C	G	C	C	G	C	C	G	C	C	G	C	C	G	C	C		19500	
	G	T	A	C	G	C	T	C	T	C	T	G	C	A	C	C	G	C	C	G	C	C		19560	
20	A	C	C	C	C	G	C	C	G	C	C	G	C	C	C	T	C	A	A	G	A	C		19620	
	C	T	G	T	C	G	A	C	C	T	C	G	A	C	A	C	A	C	A	C	A	C		19680	
25	T	C	T	T	C	G	A	C	C	A	C	C	G	C	C	T	C	G	C	C	T	C		19740	
	C	C	G	T	C	C	A	G	C	G	C	C	G	C	C	G	C	C	G	C	C	G		19800	
	C	C	G	G	C	G	T	G	A	C	C	G	C	C	G	C	C	G	C	C	G	C		19860	
30	T	C	C	G	C	C	G	C	A	C	C	G	C	C	G	C	C	T	G	C	C	G		19920	
	C	G	T	C	C	G	T	C	C	G	A	G	A	C	C	C	C	C	C	C	C	C		19980	
	T	C	A	G	T	C	C	G	C	C	G	A	C	A	C	C	C	C	C	C	C	C		20040	
35	G	A	C	C	C	G	C	C	C	G	C	C	C	C	C	C	C	C	C	C	C	C		20100	
	A	G	G	A	A	A	C	C	G	A	C	C	C	C	C	C	C	C	C	C	C	C		20160	
	G	C	C	G	A	C	C	T	G	C	A	C	C	C	C	C	C	C	C	C	C	C		20220	
40	A	T	C	G	C	G	A	T	C	G	A	T	C	G	A	T	C	G	A	T	C	G		20280	
	T	G	G	G	A	C	C	T	G	G	A	C	C	C	C	C	C	C	C	C	C	C		20340	
45	G	A	C	G	C	C	G	A	G	G	A	C	C	C	C	C	C	C	C	C	C	C		20400	
	G	G	C	G	G	G	T	T	C	C	C	C	C	C	C	C	C	C	C	C	C	C		20460	
	G	A	G	G	C	G	C	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C		20520	
50	G	A	G	C	G	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		20580	
	G	T	C	A	T	G	T	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C		20640	
	C	T	C	G	G	C	C	T	C	G	C	C	C	C	C	C	C	C	C	C	C	C		20700	
55	C	A	G	G	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		20760	

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	GCGGTGCAGT	CGTTGCGGCG	GGGCGAGTGC	GATCTCGCGT	TGGCCGGCGG	GGCGACGGTC	20820
5	TTGGCGACGC	CCACGGTGTT	CGTGGAGTTC	TCGCGGCAAC	GGGGGCTGGC	GGCGGACGGA	20880
	CGGTGCAAGG	CGTTGCGGGA	GGGCGCCGAC	GGCACGGCGT	GGGCCGAGGG	CGCCGGTGTG	20940
	CTGCTGGTGG	AGCGGCTCTC	CGACGCCCCG	CGCAACGGCC	ATCGGGTGCT	CGCGGTGGTG	21000
10	CGGGGCAGCG	CGGTCAACCA	GGACGGTGCC	AGCAACGGCC	TCACCGCACC	CAGCGGGCCC	21060
	GCCCAGCAGC	GGGTGATCCG	TGACGCGCTG	GCCGACGCGG	GGCTGACGCC	CGCCGACGTG	21120
15	GACGCGGTGC	AGGCGCACGG	CACCGGCACA	CCGCTCGGCG	ACCCGATCGA	GGCCGGCGCG	21180
	CTGATGGCCA	CCTACGGCAG	TGAACGGGTG	GGCGACCCGC	TGTGGCTGGG	TTCGCTGAAG	21240
	TCGAACATCG	GACACACCCA	GGCCGCCGCC	GGAGCCGCCG	GCGTCATCAA	GATGGTGCAG	21300
20	GCGTTACGGC	AGTCCGAGCT	GCCGCGCACC	CTGCACGTGC	ACGCGCCCTC	GGCCAAGGTC	21360
	GAATGGGACG	CGGGCGCCGT	GCAACTGCTC	ACCGGCGTCC	GGCCATGGCC	CCGGCGCGAG	21420
	CACAGGCCCC	GGCGGGCCGC	GGTCTCCGCC	TTGGGCGTCA	GCGGCACCAA	CGCCACGTGC	21480
25	ATCATCGAGG	AACCGCCCCG	GGCCGGTGAC	ACCTCGCCCG	CCGGCGACAC	CCCTGAGCCG	21540
	GGCGAGGCGA	CCGCGTCCCC	CTCCACCGCG	GCCGGGCGGT	CGTCCCCCTC	CGCGGTGGCC	21600
	GGGCCGCTGT	CCCCCTCCTC	CCCGGCCGTG	GTCTGGCCCC	TGTCCGCCGA	GACCGCCCCC	21660
30	GCCCTGCGCG	CCCAGGCCGC	CCGCCTGCGG	GCGCACCTCG	AACGCCTCCC	CGGCACCTCG	21720
	CCGACCGACA	TCGGCCACGC	CCTGGCCGCC	GAACGCGCCG	CCCTCACC CG	ACGCGTCTGT	21780
35	CTGCTCGGCG	ACGACGGAGC	CCCGGTTCGAC	GCACTCGCCG	CCCTCGCCGC	CGGCGAGACC	21840
	ACCCCCGACG	CCGTCCACGG	CACCGCGGCG	GACATCCGCC	GGGTCGCCTT	CGTGTTCCCC	21900
	GGCCAGGGTT	CCCAGTGGGC	CGGGATGGGC	GCCGAAGTGC	TGGACACGGC	CCCGGCCTTC	21960
40	GCCGCCGAAC	TGGACCGCTG	CCAGGGCGCG	CTCTCCCGGT	ACGTGGACTG	GAACCTCGCG	22020
	GACGTGCTGC	GCGGCGCGCC	CGCGGCGCCC	GGCCTCGACC	GGGTCGACGT	CGTCCAGCCG	22080
	GCCACCTTCG	CCGTCATGGT	GGGACTCGCC	GCGCTGTGGC	GCTCCCTCGG	GGTCGAACCC	22140
45	GCCGCCGTCA	TCGGCCACTC	CCAGGGCGAG	ATCGCCGCGG	CCTGCGTGGC	GGGCGCGCTC	22200
	TCCCTGGAGG	ACGCCGCCCC	GATCGTGGCC	CTGCGCTCCC	AGGTCATCGC	CCGCGAACTG	22260
	GCCGGGCGGG	GCGGCATGGC	CTCGGTGGCC	CTGCCC GCGG	CGGAGGTCTA	GGCCCGCCTG	22320
50	GCCGGCGGCG	TCGAGATCGC	CGCCGTCAAC	GGCCCCGGCT	CGACCGTCGT	CTGCGGAGAG	22380
	CCCGGCGCCC	TGGAGGCGTT	GCTCGTCACG	CTGAGAGCG	AAGGCACCCG	GGTCCGCCGC	22440
55	ATCGACGTGC	ACTACGCGTC	CCACTCCCAC	TACGTCGAGA	GCATCCGGGC	GGAACTCGCC	22500

	ACCGTCCTCG	GCCCCGTCCG	GCCGCGGAGG	GGCGACGTGC	CCTTCTACTC	CACCGTCGAG	22560
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	CCGGTGCGCT	TCGAGCCGAC	CGTACGCGCC	ATGCTCGACG	ACGGCGTCGA	CGCGTTCGTG	22680
	GAGTGCTCCG	CGCATCCCGT	CCTGACCGTC	GGCGTGCGCC	AGACCGTGGA	GAGCGCCGGC	22740
10	GGCGCGGTCC	CGGCCCTCGC	TTCGCTGCGC	CGCGACGAGG	GCGGGCTGCG	GCGCTTCCTC	22800
	ACCTCCGCCG	CCGAGGCCCA	GGTCGTCCGC	GTCCCCGTGG	ACTGGGCGAC	GCTCCGCCCA	22860
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15	CCCGCCCGGC	CCGACTCCGC	GGCGACGGCC	GCCACGACCG	GTGACGACGC	CCCGGAGCCC	22980
	GGAGACCGGC	TCGGCTACCA	CGTCGCGTGG	AAGGGACTGC	GCTCCACCAC	CGGCGGCTGG	23040
	CGCCCCGGCC	TGCGCCTGCT	GATCGTGCCC	ACCGGGGACC	AGTACACCGC	CCTCGCCGAC	23100
20	ACCCTGGAAC	AGGCGGTGCG	CTCCTTCGGC	GGAACGGTCC	GCCGCGTCGC	CTTCGACCCG	23160
	GCACGCACCG	GACGCGCCGA	GCTGTTCCGC	CTGCTCGAGA	CGGAGATCAA	CGGCGACACC	23220
25	GCCGTCACCG	GCGTCGTCTC	GCTGCTCGGA	CTGTGCACCG	ACGGCAGGCC	GGACCACCCC	23280
	GCCGTGCCCC	TCGCCGTCAC	CGCCACCCTC	GCCCTCGTCC	AGGCCCTGGC	CGACCTCGGC	23340
	AGCACCGCAC	CGTGTGGAC	CGTCACCTGC	GGCGCGGTGC	CCACCGCCCC	CGACGAACCTG	23400
30	CCGTGCACCG	CCGGTGCCCA	GCTGTGGGGC	CTGGGCCGGG	TGGCCGCGCT	GGAGCTGCCC	23460
	GAGGTGTGGG	GCGGCCTCAT	CGACCTTCCC	GCGCGGCCCG	ACGCCCCGGT	CCTGGACCGT	23520
	CTCGCCGGCG	TCCTCGCCGA	ACCGGCGGGC	GAGGACCAGA	TCGCCGTACG	GATGGCGGGC	23580
35	GTCTTCGGCC	GCCGGGTCTT	GCGGAACCCG	GCCGACTCCC	GGCCCCCGGC	CTGGCGCGCC	23640
	CGGGGCACCG	TCCTCATCGC	CGGCGACCTC	ACGACGGTGC	CCGGCCGACT	GGTCCGGTCC	23700
40	CTCCTCGAGG	ACGGCGCGGA	CCGCGTGGTG	CTGGCCGGAC	CCGACGCCCC	CGCACAGGCC	23760
	GCCGCCGCCG	GACTGACCGG	CGTCTCCCTC	GTCCCCGTGC	GCTGCGACGT	CACCGACCGC	23820
	GCCGCACTGG	CCGCGCTGCT	CGACGAGCAC	GCGCCCACCG	TCGCCGTGCA	CGCCCCGCCC	23880
45	CTGGTGCCCC	TGGCGCCGCT	GCGGGAGACG	GCACCCGGCG	ACATCGCCCG	CGCCCTCGCC	23940
	GCCAAGACCA	CGGCCGCCGG	CCACCTGGTC	GACCTGGCGC	CGGCCGCGGG	CCTCGACCGC	24000
	CTGGTGCTGT	TCTCCTCGGT	CTCCGGAGTG	TGGGGCGGCG	CGGCCCAGGG	CGGCTACGCG	24060
50	GCCGCCAGCG	CGCACCTCGA	CGCGTGGGCC	GAACGCGCCC	GCGCCGCGGG	GGTGCCCGCG	24120
	TTCTCCGTGG	CCTGGAGCCC	CTGGGCCGGA	GGCACGCCCC	CCGACGGTGC	CGAGGCGGAG	24180
	TTCTTCAGCC	GGCGCGGGCT	GGCTCCCTTC	GACCCCGACC	AGGCGGTGCG	GACCTTGCGC	24240
55	CGCATGCTGG	AGCGCGGCAG	CGCCTGCGGT	GCGGTGCGCG	ACGTGAGTGC	GAGCCGGTTC	24300

	GCCGCCTCCT	ACACCTGGGT	GCGTCCCGCC	GTACTCTTCG	ACGACATCCC	GGACGTGCAG	24360	
5	CGGCTGCGCG	CGGCCGAAC	CGCCCCGAGC	ACCGGAGACT	CGACCACCTC	CGAACTCGTC	24420	
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10	TTCCGCGACC	TCGGCTTCGA	CTCGCTGACC	GCCCTCGAAC	TGCGCGACCG	GCTCAGCACC	24600	
	AGCACCGGGC	TCAAAC	TGCC	CACCTCCCTG	GTCTTCGACC	ACTCCAGCCC	GGCCGCGCTC	24660
	GCCCGGCACC	TCGGTGAGGA	ACTCTTCGGC	CGGAACGACA	CCGCCGACCG	GGCCGGCCCC	24720	
15	GACACCCCGG	TACGGACGGA	CGAGCCCATC	GCCATCATCG	GCATGGCCTG	CCGGCTGCCC	24780	
	GGCGGGGTGC	AGTCCCCCGA	GGACCTGTGG	GACCTGCTGA	CCGGTGGGAC	CGACGCCATC	24840	
20	ACCCCTTTC	CGACCAACCG	GGGATGGGAC	AACGAGACCC	TCTACGACCC	CGACCCCGAC	24900	
	TCGCCCCGGC	ACCACACCTA	CGTGCGCGAG	GGCGGGTTCC	TGCACGACGC	GGCCGAGTTC	24960	
	GACCCCGGT	TCTTCGGCAT	CAGCCCCCGC	GAGGCCCTGG	CCATGGACCC	GCAGCAGCGG	25020	
25	CTGATCCTGG	AGACGTCC	TG	GGAGTCCCTC	GAACGGGCCG	GCATCGACCC	GGTCGAACTG	25080
	CGCGGCAGCC	GCACCGGGT	CTTCGTCGGC	ACCAACGGAC	AGCACTACGT	GCCGCTCCTC	25140	
	CAGGACGGCG	ACGAGAACTT	CGACGGCTAC	ATCGCCACCG	GCAACTCCGC	CAGCGTGATG	25200	
30	TCGGCCCGGC	TCTCCTACGT	CTTCGGACTG	GAGGGCCCCG	CCGTCACCGT	CGACACCGCC	25260	
	TGCTCGGCCT	CCCTGGCCGC	ACTGCACCTG	GCGGTGCAGT	CACTGCGCCG	CGGCGAATGC	25320	
35	GACTACGCCC	TCGCCGGCGG	GGCCACGGTG	ATGTCCACCC	CCGAGATGCT	GGTGGAGTTC	25380	
	GCCCGTCAGC	GAGCGGTGTC	GCCGGACGGC	CGCAGCAAGG	CGTTGCGCGA	GGCGGCCGAC	25440	
	GGGGTCGGTC	TCGCCGAGGG	AGCCGGGATG	CTGCTCGTGG	AGCGGCTGTC	GGAGGCGCAG	25500	
40	AAGAAGGGCC	ATCCGGTACT	GGCGGTGGTG	CGGGGCAGTG	CCGTCAACCA	GGACGGTGCC	25560	
	AGCAACGGCC	TCACCGCACC	CAGCGGGCCC	GCCCAGCAGC	GGGTGATACG	GGAGGCGCTG	25620	
	GCCGACGCGG	GGCTGACGCC	CGCCGACGTG	GACGCGGTG	AGGCGCACGG	CACCGGCAOG	25680	
45	CCGCTCGGCG	ACCCCATCGA	GGCCGGCGCG	CTGCTCGCCA	CGTACGGCCG	GGACCGGCGC	25740	
	GACGGCCCCG	TGTGGCTGGG	TTCGCTGAAG	TCGAACATCG	GGCACACCCA	GGCCGCCGCC	25800	
	GGCGTGCGCG	GGGTGATCAA	GATGGTGTG	GCGCTGCGCC	ACGGCGAGCT	GCCGCGCACC	25860	
50	CTGCACGCGT	CGACGGCGTC	GTCCAGGATC	GATTGGGACG	CGGGCGCCGT	GGAGTTGCTG	25920	
	GACGAGGCCA	GGCCCTGGCT	CCAGCGGGCC	GAGGGGCCGC	GCCGGGCGGG	CATCTCCTCG	25980	
55	TTCCGCATCA	GCGGCACCAA	CGCGCACCTC	GTCATCGAGG	AGCCGCGCGA	GCCCACCGCG	26040	

	CCCGAACTGC	TCGCGCCCGA	ACCGGCCCGCC	GACGGCGACG	TCTGGTCCGA	GGAGTGGTGG	26100
5	CACGAGGTGA	CCGTGCCCCCT	GATGATGTCC	GCGCACAAAG	AAGCCGCCCT	GCGCGACCAG	26160
	GCGCGGCGCC	TGCGCGCCGA	CCTGCTCGCC	CACCCCGAGC	TGCACCCGGC	CGACGTCCGC	26220
	TACACCCCTCA	TCACCACCCG	CACCCGGTTC	GAGCAGCGGG	CCGCCGTCGT	CGGCGAGAAC	26280
10	TTACCGGAGC	TGATCGCGGC	CCTCGACGAC	CTCGTCGAAG	GCCGACCGCA	CCCGCTCGTG	26340
	CTGCGGGGCA	CCGCCGGCAC	CTCCGACCAG	GTCTGTGTCG	TCCTCCCCGG	CCAGGGCTCG	26400
	CAGTGGCCCC	AGATGGCCGA	CGGGCTGTGT	GCCCCTCCA	GCGGCTCCGG	CTCCTTCCTG	26460
15	GAGACCGCCC	GCGCCTGCGA	CCTCGCGCTC	CGGCCCCACC	TCGGCTGGTC	CGTCCTGGAC	26520
	GTACTGCGCC	GGGAACCCGG	CGCGCCCTCG	CTCGACCGGG	TCGACGTGGT	GCAGCCCGTG	26580
	CTGTTACCA	TGATGGTCTC	GCTCGCCGAG	ACGTGGCGTT	CGCTGGGCGT	CGAACCGGCC	26640
20	GCGGTCGTCT	GTCACCTCCA	GGGCGAGATC	GCCGCCGCCT	ACGTGCGCCG	CGCCCTGACG	26700
	CTGGACGACG	CGGCGCGCAT	CGTCGCCCTG	CGCAGCCAGG	CGTGGCTGCG	GCTGGCCGGC	26760
25	AAGGGCGGCA	TGGTCGCCGT	GACCCGTGTC	GAACGCGACC	TGCGTCCCCG	CCTGGAGCCC	26820
	TGGAGCGACC	GGCTCGCCGT	CGCCGCCGTC	AACGGCCCCG	AGACCTGCGC	CGTCTCCGGG	26880
	GACCCGGACG	CCCTGGCGGA	GCTGGTCGCC	GAACTCGGTG	CGGAGGGCGT	GCAGCCCCGC	26940
30	CCCATCCCCG	GCGTCGACAC	CGCCGGGCAC	TCGCCGCAGG	TCGACACGCT	GGAGGCCCCAC	27000
	CTGCGGAAGG	TGCTCGCGCC	CGTCGCGCCC	CGCACCTCCG	ACATCCCGTT	CTACTCGACG	27060
	GTCACCGGAG	GA CTGATCGA	CACCGCCGAG	CTGGACGCCG	ACTACTGGTA	CCGCAACATG	27120
35	CGCGAGCCGG	TGGAGTTCGA	GCAGGCCACC	CGCGCCCTGA	TCGCCGACGG	CCACGACGTG	27180
	TTCTTGAGT	CGAGCCCGCA	CCCCATGCTG	GCCGTCTCCC	TCCAGGAGAC	GATCAGCGAC	27240
	GCCGGTTCCC	CGGCGGCCGT	CCTCGGCACC	CTGCGGCGCG	GCCAGGGCGG	CCCCCGCTGG	27300
40	CTGGGCGTCG	CCCTCTGCCG	CGCCTACACC	CACGGCCTGG	AGATCGACGC	CGAGGCCATC	27360
	TTCGGCCCCG	ACTCACGCCA	GGTGGAAC TG	CCCACGTACC	CCTTCCAGCG	CGAGCGCTAC	27420
45	TGGTACAGCC	CCGGCCACCG	CGGTGACGAC	CCCGCTCCC	TCGGTCTGGA	CGCCGTCGAC	27480
	CACCCGCTGC	TGGGCAGCGG	CGTCGAACTG	CCGGAGTCCG	GTGACCGGAT	GTACACCGCA	27540
	CGGCTGGGCG	CCGACACCAC	CCCGTGCGTG	GCCGACCACG	CGCTGCTGGG	GTCGCCGCTG	27600
50	CTGCCCGGCG	CGCCCTTCGC	CGACCTGGCG	CTCTGGGCGG	GCCGCCAGGC	CGGCACCGGC	27660
	CGCGTCGAGG	AGCTCACCCT	GGCCGCGCCC	CTGGTGCTGC	CCGGCTCCGG	GGGTGTCCGG	27720
	CTGCGGCTGA	ACGTGGGCGC	CCGGGGCACC	GACGACGCCC	GCCGCTTCGC	CGTGACGCC	27780
55	CGCGCCGAGG	GCGCCACGGA	CTGGACCCTG	CACGCCGAGG	GGCTGCTCAC	CGCGCAGGAC	27840

	ACGGCCGACG	CGCCGGACGC	CTCGGCGGCC	ACCCCGCCCC	CCGGCGCCGA	ACAACTGGAC	27900
5	ATCGGCGACT	TCTACCAGCG	CTTCTCCGAA	CTCGGTTACG	GCTACGGCCC	GTTCTTCCGG	27960
	GGACTGGTGA	GCGCCCACCG	CTGCGGCCCC	GACATCCACG	CGGAGGTGCG	GCTGCCCCGTC	28020
	CAGGCGCAGG	GCGACGCGGC	CCGCTTCCGC	ATCCATCCCG	CGCTGCTGGA	CGCGGCGCTG	28080
10	CAGACCATGA	GCCTCGGGGG	CTTCTTCCCC	GAGGACGGCC	GCGTCCGCAT	GCCGTTCGCC	28140
	CTGCGCGCG	TTCGGCTGTA	CCGCGCCCGA	GCCGACCGGC	TGCACGTGCG	CGTCTCGCCC	28200
	GTCCTCGAGG	ACGCGGTCCG	CATCAGGTGC	GCCGACGGCG	AGGGACGGCC	GGTCGCCGAG	28260
15	ATCGAGTCCT	TCATCATGCG	GCCGGTCGAC	CCGGGACAGC	TCCTGGGCGG	CCGCCC GGTC	28320
	GGCGCCGACG	CGCTCTTCCG	CATCGCCTGG	CGGGAACTCG	CCGCCGGCCC	GGGCACCCGT	28380
20	ACCGGCGACG	GCACCCCTCC	CCCGGTGCGC	TGGGTGCTGG	CGGGACCCGA	CGCGCTGGGC	28440
	CTGGCCGAGG	CGGCCGACGC	CCACCTGCCC	GCCGTTCCCG	GCCCCGACGG	CGCACTGCCG	28500
	TCCCCGACGG	GACGCCCGGC	GCCGGACGCC	GTCGTGTTTCG	CGGTCCGTGC	CGGGACCGGC	28560
25	GACGTCGCCC	CCGACGCGCA	CACCGTGCC	TGCCGGGTGC	TGGACCTCGT	CCAGCGCCGG	28620
	CTCGCGGCC	CGGAGGGCCC	GGACGGCGCC	CGCCTGGTGG	TGGCCACCCG	CGGCGCGGTC	28680
	GCCGTACGCG	ACGACGCCGA	GGTGGACGAC	CCGGCCGCGG	CCGCCGCGTG	GGGCCTGCTG	28740
30	CGCTCCGCGC	AGGCCGAGGA	GCCCCGCCCG	TTCCTGCTCG	TGGACCTGGA	CGACGACCCG	28800
	GCGTCCGCCC	GGGCGCTGAC	CGACGCCCTC	GCCTCCGGCG	AACCGCAGAC	CGCGGTCCGG	28860
35	GCCGGGACGG	TGTACGTGCC	CCGGCTGGAG	CGGGCCGCGG	ACCGCACGGA	CGGGCCGCTC	28920
	ACCCCGCCCC	ACGACGGTGC	CTGGCGGCTG	GGCCGGGGCA	CCGACCTCAC	CCTCGACGGC	28980
	CTCGCCCTGG	TGCCCCCCCC	GGACGCCGAG	GCGCCGCTGG	AGCCCGGCCA	GGTGCGCGTC	29040
40	GCCGTACGCG	CCGCGGGCGT	CAACTTCCGC	GACGCCCTCA	TGCCCTCCGG	CATGTACCCG	29100
	GGCGAGGCGG	AGATGGGAAC	GGAGGGCGCC	GGCACCGTCG	TCGAGGTCCG	CCCCGGCGTC	29160
	ACCGGTGTTCG	CCGTCCGGCA	CCGCTGTCTC	GGCCTGTGGG	ACGGCGGCCT	GGGCCCGCTG	29220
45	TGCGTGGCCG	ACCACCGGCT	GCTCGCCCCC	GTCCGGACG	GCTGGTCCTA	CGCCCAGGCC	29280
	GCCTCGGTCC	CCGCGGTGTT	CCTCAGCGCC	TACTACGGTC	TGGTCACCCT	GGCCGGCCTC	29340
	AGGCCGGGGG	AGCGGGTGCT	CGTGACGCC	GCCCGCGGGG	GCGTCGGCAT	GGCCGCGGTG	29400
50	CAGATCGCCC	GCCACCTCCG	CGCGGAGGTG	CTGGCCACCG	CGAGCCCCCG	CAAGTGGGAC	29460
	GCCCTGCGCG	CCATGGGCAT	CACCGACGAC	CACCTCGCCT	CCTCCCGCAC	CCTCGACTTC	29520
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	ACCAAGGAGT	TCGTGGACGC	CTCCCTCGGG	CTGCTCCGTC	CGGGCGGCCG	GTTCTGGAG	29640
5	CTGGGCAAGA	CCGACGTCCG	GGACCCCGAG	CGGATCGCCG	CCGAACACCC	CGGGGTGCCG	29700
	TACCGGGCGT	TCGACCTCAA	CGAGGCCGGA	CCCACGCAC	TCGGCCGGCT	GCTGCGGGAA	29760
	CTGATGGACC	TGTTCCGCCG	CGGCGTGCTG	CACCCGCTGC	CCGTCTCAC	CCACGACGTG	29820
10	CGCCGGGCCG	CGGACGCCCT	GCGACCATC	AGCCAGGCC	GGCACACCGG	AAAGCTCGTC	29880
	CTGACCATGC	CGCCCGCCTG	GCACCCGTAC	GGCACGGTCC	TGGTCACCGG	TGGCACCGGC	29940
	GCCCTCGGCA	GCCGCATCGC	CCGCCACCTG	GCGAGCCGGC	ACGGCGTCCG	CCGGCTGCTG	30000
15	ATCGCCGCC	GCCGGGGCCC	GGACGGCGAG	GGCGCCGGG	AGCTGGTCGC	CGACCTCGCC	30060
	GCCCTGGGCG	CGTCGGCCAC	CGTGGTCGCC	TGCGACGTCT	CCGACGCGGA	CGCCGTCCGC	30120
	GGACTGCTCG	CCGGCATAAC	GGCCGATCAC	CCGTGACGG	CGGTGGTGCA	CAGCACCGGC	30180
20	GTCTTCGACG	ACGGCGTGCT	GCCCGGGCTC	ACCCCCGAGC	GGATGCGGCG	CGTGCTGCGG	30240
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25	TTCGTCTCT	TCTCTCCAG	CGCCGGTCTG	CTGGGCAGCC	CGGCCCAGGG	CAACTACGGC	30360
	GCGGCCAACG	CCACCCTCGA	CGCCCTCGCC	GCCCGGCGCC	GGTCCCTCGG	CCTCCCGTCG	30420
	GTGTCACTCG	CCTGGGGTCT	GTGGTCCGAC	ACCAGCCGGA	TGGCACACGC	ACTGGACCAG	30480
30	GAGAGCCTCC	AGCGGCGCTT	CGCCCGCAGC	GGCTTCCCGC	CCCTGTCCGC	CACGCTGGGC	30540
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35	TCCGCCCCGG	CGACCGGGTC	CGCGGCCCCG	GCGTCCGGCC	CCCTTCCGGC	TCCGGACGCC	30720
	GGGACCGTCG	GCGAGCCGCT	CGCCGAGCGG	TTGGCCGGAC	TCTCCGCCGA	GGAACGCCAC	30780
40	GACCGGCTGC	TCGGCCTGGT	CGGCGAACAC	GTGGCCGGG	TACTGGGCCA	CGGCTCCGCC	30840
	GCCGAGGTCC	GGCCCGACCG	GCCGTTCCGC	GAGGTCCGGT	TCGACTCGCT	CACGGCCGTG	30900
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45	GACCACCCCA	CCCCCGCCG	GCTGTCTCG	CACCTCGACG	GCCTGCTGGC	CCCGGCACAG	31020
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	CTACCCCCCG	AGCACCTCGC	GGAGCTCGCC	CCCCCCCCCG	ACGACCGGGC	CGAGGTCCGC	31140
50	CTGCGCCTGG	ACGCCCTGGC	CGACCGCTGG	CGCGCCCTGC	ACGACGGCGC	GCCCGGCGCC	31200
	GACGACGACA	TCACCGACGT	GCTGAGCAGC	GCCGACGACG	ACGAGATCTT	CGCGTTCATC	31260
	GACGAGCGGT	ACGGCACGTC	GTGACCGCCG	GCCCGGAGCC	CCGCCCGTCA	TCGAAAGGAA	31320
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	TGCTGCACGC CGGTGCCGAC GCGGTGCGCC CGGCCCCCGC CGACCGCGGC TGGGACGTGG	31560
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	TCACCATGGA CCCCCAGCAG CGGCTGCTGC TGGAGACCTC CTGGGAGGCG CTGGAGCGAG	31740
	CCGGTCTGGA CCCCCAGTCC CTGGCGGGCA GCCGGACCGG CGTGTTTCGCC GGGGCGTGGG	31800
15	AGAGCGGCTA CCAGAAGGGC GTCGAAGGGC TCGAAGCCGA TCTGGAGGCC CAACTCCTGG	31860
	CCGGCATCGT CAGCTTCACC GCCGGCCGCG TCGCCTACGC CCTGGGCCTG GAGGGCCCCG	31920
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	CACTGCGCCG GGGCGAGTGC GACCTCGCAC TGGCGGGCGG CGCCACGGTC ATCGCCGACT	32040
	TCGCGCTCTT CACCCAGTTC TCCCGGCAGC GCGGGCTCGC CCCCACGGG CGGTGCAAGG	32100
25	CCTTCGGTGA GACGGCCGAC GGCTTCGGCC CCGCCGAGGG CGCGGGGATG CTGCTGGTCG	32160
	AGCGGTGTC GGACGCCCCG CGCAACGGG ACCCGGTGCT GCGGTGGTG CGGGGCAGTG	32220
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	CGTACGGCA CGAACGGACG GGCGACCCGC TGTGGCTGGG TTCGCTGAAG TCGAACATCG	32460
35	GGCACACCCA GGCCGCCGCC GCGGTGGCCG GGGTGATCAA GATGGTGCTG GCGCTGCGCC	32520
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	CGGGCAGCGG CCGGCCCCC GTCTTCGTCT TCCCGGACA GGGCTCCAG TGGACGGCA	33060
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	TCGCGGCGCT	GTGGGAGTCC	CACGGTGTAC	GGCCCCCGCG	CGTGGTCGGC	CACTCCCAAG	33300
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	CCACCTGCG	GACGCTGCTG	CGCGAGGGCC	ACCGCACCTT	CGTCGAGATG	GGCCCCGACC	33840
25	CCCTGCTGGG	CGCCGCGATC	GACGAGGTGC	CCGAGGCCGA	GGGCGTGCAC	GCCACCGCCC	33900
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50	GTGAGGATCA	GGTGGCGGTG	CGTGGTGGGG	GTGTGTTCGG	TCGTCTCTCT	GTGGGTGTGG	34740
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10	ATGCGTTTCGT GTTGTCTCTG TCGGGTGCTG GGGTGTGGGG GAGTGGGGGG CAGTCGGTGT	35220
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25	CGGTGGCGGC GGAGGTCTCT GGTACGACG GGATCGCGCG CATCGGCCAC GACGTGGCCT	35700
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	GTCGTTGGTG	GCGTTGCATC	TGGCGGTGCA	GTCGTTGCGG	CGGGGCGAGT	GCGACCTGGC	36840
	GTTGGCCGGC	GGCGTCGCGG	TCATGCCCCA	CCCGACGGTG	TTCGTGGAGT	TCTCGCGGCA	36900
10	GCGGGGGCTG	GCGGTGGACG	GGCGGTGCAA	GGCGTTCGCG	GAGGGTGC GG	ACGGGACGGC	36960
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	TGGTGTGATC	AAGGTGGTGC	AGGCGATGCG	GCATGGGTGC	TTGCCGCGGA	CGCTGCATGT	37380
25	GGATGCGCCG	TCGTCAAGG	TGGAGTGGGC	TTCCGGTGCG	GTGGAGCTGC	TGACCGAGGG	37440
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	CTCGGCACGC	TCGCGGGAGG	CGCTGCGCGG	CCAGGCCGGA	CGACTCGCCG	CTCTCGCCCG	37680
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45	GTTCCGCCGAG	CCCCCACGCG	CGGACGCGCG	ACTCTCGAC	CGCACCGACT	ACACCCAGCC	38100
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	CGAGGGCGGC	GCGATGGCGG	CCGTGCAGGC	CACCGAGCGG	GAGGCCGCGG	CGCTGGAGCC	38340
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55	CGGGGACGAG	GCGGCCGTAC	TGGCGGCGGC	CGGTGAAC TG	GCCGCCCGCG	GACGCCGCAC	38460

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	AGTGACCGGC	GACCTCGCCG	ACGCCGCCCA	GCTGACCGAC	CCCGGCTACT	GGACCCGCCA	38640
	GGTGCGGCAG	CCGGTGCGCT	TCGCCGACGC	CGTGCGCACC	GCGAGCGCCC	GGGACGCCGC	38700
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	CGCGGAGGCC	GACGTCTGT	TCGCCCGGC	ACTGCGCCGC	GGGCGCCCG	AGGGCGACAC	38820
	CGTGCTCCGG	GCCGCCGCGA	GCGCGTACGT	CCGCGCGCG	GGCCTCGACT	GGGCCGCGCT	38880
15	CTACGGCGGC	ACGGGAGCCC	GCCGCACCGA	CCTGCCACC	TACGCCCTTC	AGCACAGCCG	38940
	CTACTGGCTC	GCCCCCGCCT	CGGCCGCGGT	CGCCCCCGC	ACGCCCGCCC	CCTCCGTCCG	39000
20	ATCCGTGCCG	GAAGCCGAGC	AGGACGGGGC	GCTGTGGGCC	GCCGTGCACG	CCGGTGACGT	39060
	CGCCTCGGCC	GCGGCGCGAC	TGGGCGCCGA	CGACGCCGGT	ATCGAACACG	AACTGCGCGC	39120
	GGTCTCGCCG	CACCTGGCCG	CCTGGCACGA	CCGCGACCGC	GCGACCGCGC	GGACCGCGGG	39180
25	CCTGCACTAC	CGCGTCACCT	GGCAGGCGAT	CGAGGCAGAC	GCTGTCAGGT	TCAGCCCCCTC	39240
	GGATCGCTGG	CTGATGGTCG	AGCATGGGCA	GCACACGGAA	TGCGCGGACG	CCGCGGAACG	39300
	GGCGCTGCGC	GCGGCCGCG	CGGAGGTCAC	CCGCCTGGTG	TGGCCGCTGG	AGCAGCACAC	39360
30	CGGATCACCG	CGGACGGAGA	CCCCGACCG	CGGCACCCTG	GCGGCCCCGG	TGGCCGAGCT	39420
	CGCACGGAGC	CCGGAGGGCC	TGGCCGGCGT	GCTGCTGCTC	CCCGACTCGG	GCGGTGCCGC	39480
	GGTCGCCGGG	CACCCCGGGC	TGGACCAGGG	AACGGCGGCG	GTGCTGCTGA	CGATCCAGGC	39540
35	ACTGACCGAC	GCCGCGGTGC	GGGCACCGCT	GTGGGTGGTG	ACGCGGGGTG	CGGTGGCGGT	39600
	GGGGTCGGGT	GAGGTGCCGT	GTGCGGTGGG	TGCGCGGGTG	TGGGGTCTGG	GGCGGTGGC	39660
40	TGCGTTGGAG	GTGCCGGTGC	AGTGGGGTGG	GTTGGTGGAT	GTGGCGGTGG	GGCGCGGTGT	39720
	GCGTGAGTGG	CGTCGTGTGG	TGGTGTGGT	TGCGGGGGGT	GGTGAGGATC	AGGTGGCGGT	39780
	GCGTGGTGGG	GGTGTGTTGG	GTGCTGCTCT	GGTGGGTGTG	GGGGTGCGGG	GTGGTTCGGG	39840
45	GGTGTGGCGT	GCGCGGGGGT	GTGTGGTGGT	GACGGGTGGG	TTGGGTGGTG	TGGGGGTCA	39900
	TGTGGCGCGG	TGGTTGGCGC	GTTGGGGTGC	GGAGCATGTG	GTGTTGGCGG	GGCGTCCGGG	39960
	TGGTGGGGTT	GTGGGGGCGG	TGGAGTTGGA	GCGGGAGTTG	GTGGCGTTGG	GGGCGAAGGT	40020
50	GACGTTGCTT	TCGTGTGATG	TGGGGGATCG	GGCGTCGGTG	GTGGGGTTGT	TGGGTGTGGT	40080
	GGAGGGGTTG	GGGGTGCCGT	TGCGTGGTGT	GTTTCATGCG	GCGGGGGTGG	CTCAGGTGTC	40140
55	GGGGTTGGGT	GAGGTGTCTG	TGGCGGAGGC	GGGTGGTGTG	TTGGGGGGTA	AGGCGGTGGG	40200

	GGCTGAGTTG TTGGACGAGT TGACGGCGGG TGTGGAGCTG GATGCGTTTCG TGTGTGTTCTC	40260
5	GTCGGGTGCT GGGGTGTGGG GGAGTGGGGG GCAGTCGGTG TATGCGGCGG CCAATGCGCA	40320
	TCTGGATGCG TTGGCGGAGC GTCGTCGTGC GCAGGGGCGT CCCGCGACCT CCGTCGCCTG	40380
	GGGCCCCGTGG GACGGCGACG GCATGGGCGA GATGGCGCCC GAGGGCTACT TCGCCCCCA	40440
10	CGGCGTGGCC CCGCTCCACC CCGAGACGGC GCTCACC GCC CTGCACCAGG CCATCGACGG	40500
	CGGCGAAGCC ACGGTCACCG TGGCGGACAT CGACTGGGAA CGGTTCGCCC CCGGCTTCAC	40560
	CGCCTTCCGT CCCAGCCCC TGATCGCCGG CATCCCCGCG GCCCGTACGG CGCCCGCCGC	40620
15	CGGCGGCCCC GCGGAGGACA CCCCCACCGC CCGGGCCTC CTGCGGGCGC GGCCCGAGGA	40680
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	CGAGGACGCC CGGGTCGACG CCGGGGCCCC CTTCGGGAC CTCGGCTTCG ACTCGCTCGC	40800
20	CGCGGTGCGG CTGCGCCGCC GGCTGGCCGA GGACACCGGG CTCGACCTGC CCGGCACCTT	40860
	CGTCTTCGAC CACGAGGACC CCACCGCGCT GGCCCAACAC CTGGCCGGCC TCGCCGACGC	40920
25	GGGACCCCC GGGCCCCAGG AGGGCACGGC TCGGGCCGAG AGCGGGCTGT TCGCCTCCTT	40980
	CCGCGCCGCC GTCGAACAGC GCAGGTCGAG CGAGGTCGTG GAGCTGATGG CCGACCTGGC	41040
	GGGTTTCGG CCCGCCTACT CCGGCAGCA CCGGGCTCC GGCCGCCCCG CGCCCGTACC	41100
30	CCTCGCGACC GGACCGGCGA CGCGTCCCAC GCTGTACTGC TCGCGCGGCA CCGCGGTCGG	41160
	CTCCGGGCCC GCGGAGTACG TCCCGTTGCG CGAAGGACTG CGCGGCGTCC GGGAGACGGT	41220
	CGCCCTTCCC CTGTCCGGCT TCGGCGACCC CGCGGAACCG ATGCCCCGAT CGCTCGACGC	41280
35	GCTGATCGAG GTCCAGGCCG ACGTCTCCT GGAGCACACC GCGGGCAAGC CCTTCGCCCT	41340
	CGCCGGCCAC TCCGCCGGCG CGAACATCGC CCACGCCCTG GCCGCCCGC TGGAGGAACG	41400
	CGGCTCGGGC CCGGAGCCG TCGTACTGAT GGACGTTAC CGTCCCGAGG ACCCGGTGC	41460
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	GCCCGCGGGC GGGGCGCGGG GCGACTGGCG GTCCAGGTC CCGTTGCGAC GGACCGTCGC	41700
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	GAAACACTGA TGTACGCCGA CGACATCGCG GCCGTCTACG ACCTGGTCCA CGAGGGGAAG	41880
	GGGAAGGACT ACCGGCAGGA GGCCGAGGAG ATCGCCGCAC TCGTGCGCGT CCACCGGCCG	41940
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5	GGCCCGAACC	CCGGTGTCAC	CTTCACCAA	GGGACATGC	GCTCGTTCTC	CCTGGGACGC	42120
	CGGTPCGACG	CGGTGACCTG	CATGTTTCAGC	TCCATAGGCC	ACCTGCGGAC	CACCGACGAA	42180
	CTCGACAGCA	CGCTGCGGGC	CTTCACCGAC	CACCTCGAAC	CGTCCGGCGT	CATCGTCGTC	42240
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	GCGGGCGAGC	GCACCGTCTG	CCGGGTCTCG	CACTCCGTAC	GGGAGGGGAA	CGCCACCCGC	42360
	ATCGAGGTGC	ACTACCTCCT	CGCCGGACCC	GGCGGCGTCC	GTCACTGAC	CGAGGACCAC	42420
15	ACCATCACCC	TGTTCCCGCG	CGCCGACTAC	GAGGCGGCCT	TCGAGCGCGC	CGGCTGCGAC	42480
	GTGGTCTACC	AGGAAGGCGG	CCCGTCCGGT	CGCGGCTGT	TCATCGGCAC	CGCCCGCTGA	42540
20	CCCGGTGCCG	ACGCGGACCG	CCGCGGCCCG	GAGGCGGGTT	GCCCCGACCC	ACCCGGCACA	42600
	CCCGGTCCC	CCGATCGTGC	GAGCGCCCC	ATCGACCCGA	GAAGAAAGGC	AGGGCAGCCA	42660
	TGCCCCACCT	TGCCACGGAA	ACGGCCCCCG	CGAGCACGAG	CACGAGCGCG	GGCACGAGCA	42720
25	CGGGCGTCCG	TGCGCTCGGC	CGTCGGCTCC	AGCTGACCCG	GGCCGCACAC	TGGTGCGCCG	42780
	GCAACCAGGG	CGACCCGTAC	GCGCTGATCC	TGCGCGCCGT	CGCCGACCCC	GAGCCGTTTCG	42840
	AACGGGAGAT	CCGGGCCCCG	GGACCGTGGT	TCCGCAGCGA	ACAGCTGGAC	GCCTGGGTGA	42900
30	CCGCGGACCC	CGAGGTGGCG	GCGGCCGTCC	TGGCCGACCC	GCGCTTCGGC	ACGCTGGACC	42960
	GGGCCGGACG	CCGCCCCGAC	GAGGAACTGC	TGCCCCTCGC	CGAGGCGTTC	CCCCACCACG	43020
	AACGCGCGGA	GCTCGTACGC	CTGCGGGCGC	TGGCCGCCCC	GGTGCTCAGC	CGGTACGCCC	43080
35	CGGCCCAGGC	GCCCTGCGCG	GCGCGCACCA	CCGCCCGCAG	AGTGCTCGGC	CGCCTGCTGC	43140
	CCACCGGTGA	CGCCGGGTTC	GACCTTGTTCG	GCGAGGTGCG	CCGGCCCTAC	GCCGTGAGC	43200
40	TGATGCTCAG	GCTCCTCGGA	GTGCCGGGCC	GCGACCGCGC	CACCGCCGCG	CGGGCACTCG	43260
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	AGTCCGCCGA	CGCCGTCCGC	ACACTGGCCG	ACCTGGTCCC	CGAGCTCGTC	GCGGAGAAGT	43380
45	CCCGGGGCCT	CGGGAACGCC	GAGCCCCGGC	CCGACGACGT	GCTCGCCCTC	CTCCTGCACG	43440
	ACGGCGTCGC	CCCCGGCGAC	GTCGAGCGCA	TCGCGCTGCT	CCTCGCGGTC	GGCGCACCCG	43500
	AACCCGTCTG	CACCGCCGTC	GCGCACACGG	TCCACCGGCT	GCTCGGCCGG	CCGGGGGAGT	43560
50	GGGAGAGGGC	CCGCCGGACG	CCGGCCGCGG	CGAACCCCGT	CGACCAGGTG	CTGCCCGAGC	43620
	GCCCCCGGC	CCGGCTGGAG	AACCGGGTCG	CGCACACCGG	CCTCGAACTC	GGCGGCCGCC	43680
55	GGATCACCGC	CGACGAGCAC	GTCGTGGTGC	TGGCCGCCGC	CGACGGGAG	ATCCCCGGGC	43740

CGGAGCCGCT CGGGGGCGCC GACGGACCGC ACCTGGCGCT CGCCCTCCCG CTGATCCGCC 43800
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 GACCGCCCTT GACCGGCGCG CGGTCACCGG TCCTGGGCGC CTGCGCCCGC CTCCGGGTCC 43920
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 10 TGCTGACATC CCTCGCCAC AACACCCACT ACTACAGTCT GGTGCCCCCTC GCCTGGGCGC 44040
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 15 CCGAGATGGG CAGAGACCTC GTCCCTTACC AGAGGGGCTT CGAGTTCGGT GAGGTGGAGA 44220
 3GCGAGGAGGA GACCACCTGG GAGTACCTGC TCGGCCAGCA GAGCATGATG GCCGCCCTGT 44280
 GCTTCGCCCC GTTCAACGGC GCCGCCACGA TGGACGAGAT CGTCGACTTC GCCCGTGGCT 44340
 20 GGCGGCCCGA CCTGGTCGTG TGGGAACCCT GGACCTA 44377

(2) INFORMATION FOR SEQ ID NO:2:

25 (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 4550 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: unknown

30 (ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

35 Met Ser Gly Glu Leu Ala Ile Ser Arg Ser Asp Asp Arg Ser Asp Ala
 1 5 10 15
 Val Ala Val Val Gly Met Ala Cys Arg Phe Pro Gly Ala Pro Gly Ile
 20 25 30
 40 Ala Glu Phe Trp Lys Leu Leu Thr Asp Gly Arg Asp Ala Ile Gly Arg
 35 40 45
 Asp Ala Asp Gly Arg Arg Arg Gly Met Ile Glu Ala Pro Gly Asp Phe
 50 55 60
 45 Asp Ala Ala Phe Phe Gly Met Ser Pro Arg Glu Ala Ala Glu Thr Asp
 65 70 75 80
 Pro Gln Gln Arg Leu Met Leu Glu Leu Gly Trp Glu Ala Leu Glu Asp
 85 90 95
 50 Ala Gly Ile Val Pro Gly Ser Leu Arg Gly Glu Ala Val Gly Val Phe
 100 105 110
 Val Gly Ala Met His Asp Asp Tyr Ala Thr Leu Leu His Arg Ala Gly
 115 120 125
 55

EP 0 791 656 A2

	Ala	Pro	Val	Gly	Pro	His	Thr	Ala	Thr	Gly	Leu	Gln	Arg	Ala	Met	Leu	
		130					135					140					
5	Ala	Asn	Arg	Leu	Ser	Tyr	Val	Leu	Gly	Thr	Arg	Gly	Pro	Ser	Leu	Ala	
	145					150					155					160	
	Val	Asp	Thr	Ala	Gln	Ser	Ser	Ser	Leu	Val	Ala	Val	Ala	Leu	Ala	Val	
					165					170						175	
10	Glu	Ser	Leu	Arg	Ala	Gly	Thr	Ser	Arg	Val	Ala	Val	Ala	Gly	Gly	Val	
				180					185					190			
	Asn	Leu	Val	Leu	Ala	Asp	Glu	Gly	Thr	Ala	Ala	Met	Glu	Arg	Leu	Gly	
		195					200						205				
15	Ala	Leu	Ser	Pro	Asp	Gly	Arg	Cys	His	Thr	Phe	Asp	Ala	Arg	Ala	Asn	
	210						215					220					
	Gly	Tyr	Val	Arg	Gly	Glu	Gly	Gly	Ala	Ala	Val	Val	Leu	Lys	Pro	Leu	
	225					230					235					240	
20	Ala	Asp	Ala	Leu	Ala	Asp	Gly	Asp	Pro	Val	Tyr	Cys	Val	Val	Arg	Gly	
					245					250					255		
	Val	Ala	Val	Gly	Asn	Asp	Gly	Gly	Gly	Pro	Gly	Leu	Thr	Ala	Pro	Asp	
25				260					265					270			
	Arg	Glu	Gly	Gln	Glu	Ala	Val	Leu	Arg	Ala	Ala	Cys	Ala	Gln	Ala	Arg	
		275						280					285				
30	Val	Asp	Pro	Ala	Glu	Val	Arg	Phe	Val	Glu	Leu	His	Gly	Thr	Gly	Thr	
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	Pro	Val	Gly	Asp	Pro	Val	Glu	Ala	His	Ala	Leu	Gly	Ala	Val	His	Gly	
	305					310					315					320	
35	Ser	Gly	Arg	Pro	Ala	Asp	Asp	Pro	Leu	Leu	Val	Gly	Ser	Val	Lys	Thr	
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	Asn	Ile	Gly	His	Leu	Glu	Gly	Ala	Ala	Gly	Ile	Ala	Gly	Leu	Val	Lys	
			340					345						350			
40	Ala	Ala	Leu	Cys	Leu	Arg	Glu	Arg	Thr	Leu	Pro	Gly	Ser	Leu	Asn	Phe	
		355						360					365				
	Ala	Thr	Pro	Ser	Pro	Ala	Ile	Pro	Leu	Asp	Gln	Leu	Arg	Leu	Lys	Val	
		370					375					380					
45	Gln	Thr	Ala	Ala	Ala	Glu	Leu	Pro	Leu	Ala	Pro	Gly	Gly	Ala	Pro	Leu	
	385					390					395					400	
	Leu	Ala	Gly	Val	Ser	Ser	Phe	Gly	Ile	Gly	Gly	Thr	Asn	Cys	His	Val	
				405						410					415		
50	Val	Leu	Glu	His	Leu	Pro	Ser	Arg	Pro	Thr	Pro	Ala	Val	Ser	Val	Ala	
				420					425					430			
55	Ala	Ser	Leu	Pro	Asp	Val	Pro	Pro	Leu	Leu	Leu	Ser	Ala	Arg	Ser	Glu	
		435						440						445			

Gly Ala Leu Arg Ala Gln Ala Val Arg Leu Gly Glu Tyr Val Glu Arg
 450 455 460

5 Val Gly Ala Asp Pro Arg Asp Val Ala Tyr Ser Leu Ala Ser Thr Arg
 465 470 475 480

Thr Leu Phe Glu His Arg Ala Val Val Pro Cys Gly Gly Arg Gly Glu
 485 490 495

10 Leu Val Ala Ala Leu Gly Gly Phe Ala Ala Gly Arg Val Ser Gly Gly
 500 505 510

Val Arg Ser Gly Arg Ala Val Pro Gly Gly Val Gly Val Leu Phe Thr
 515 520 525

15 Gly Gln Gly Ala Gln Trp Val Gly Met Gly Arg Gly Leu Tyr Ala Gly
 530 535 540

Gly Gly Val Phe Ala Glu Val Leu Asp Glu Val Leu Ser Met Val Gly
 545 550 555 560

20 Glu Val Asp Gly Arg Ser Leu Arg Asp Val Met Phe Gly Asp Val Asp
 565 570 575

Val Asp Ala Gly Ala Gly Ala Asp Ala Gly Ala Gly Ala Gly Ala Gly
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25 Val Gly Ser Gly Ser Gly Ser Val Gly Gly Leu Leu Gly Arg Thr Glu
 595 600 605

Phe Ala Gln Pro Ala Leu Phe Ala Leu Glu Val Ala Leu Phe Arg Ala
 610 615 620

30 Leu Glu Ala Arg Gly Val Glu Val Ser Val Val Leu Gly His Ser Val
 625 630 635 640

Gly Glu Val Ala Ala Ala Tyr Val Ala Gly Val Leu Ser Leu Gly Asp
 645 650 655

Ala Val Arg Leu Val Val Ala Arg Gly Gly Leu Met Gly Gly Leu Pro
 660 665 670

40 Val Gly Gly Gly Met Trp Ser Val Gly Ala Ser Glu Ser Val Val Arg
 675 680 685

Gly Val Val Glu Gly Leu Gly Glu Trp Val Ser Val Ala Ala Val Asn
 690 695 700

45 Gly Pro Arg Ser Val Val Leu Ser Gly Asp Val Gly Val Leu Glu Ser
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Val Val Ala Ser Leu Met Gly Asp Gly Val Glu Cys Arg Arg Leu Asp
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50 Val Ser His Gly Phe His Ser Val Leu Met Glu Pro Val Leu Gly Glu
 740 745 750

Phe Arg Gly Val Val Glu Ser Leu Glu Phe Gly Arg Val Arg Pro Gly
 755 760 765

55

Val Val Val Val Ser Gly Val Ser Gly Gly Val Val Gly Ser Gly Glu
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 5 Leu Gly Asp Pro Gly Tyr Trp Val Arg His Ala Arg Glu Ala Val Arg
 785 790 795 800
 Phe Ala Asp Gly Val Gly Val Val Arg Gly Leu Gly Val Gly Thr Leu
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 10 Val Glu Val Gly Pro His Gly Val Leu Thr Gly Met Ala Gly Glu Cys
 820 825 830
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 15 Arg Ala Glu Arg Glu Val Phe Glu Ala Ala Leu Ala Thr Val Phe Thr
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 20 Arg Arg Ile Asp Leu Pro Thr Tyr Pro Phe Gln Arg Arg Thr His Trp
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 1010 1015 1020
 45 Glu Ala Ala Gly Gly Pro Lys Asp Ser Val Ala Gly Gly Pro Gly Val
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 1045 1050 1055
 50 Asp Asp Asp Asp Pro Ile Ala Ile Val Gly Val Gly Cys Arg Leu Pro
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 Gly Gly Val Asp Ser Arg Ala Ala Leu Trp Glu Leu Leu Glu Ser Gly
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	Ala Asp Ala Ile Ser Ser Phe Pro Thr Asp Arg Gly Trp Asp Leu Asp	
	1090	1095 1100
5	Gly Leu Tyr Asp Pro Glu Pro Gly Thr Pro Gly Lys Thr Tyr Val Arg	
	1105	1110 1115 1120
	Glu Gly Gly Phe Leu His Ser Ala Ala Glu Phe Asp Ala Glu Phe Phe	
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10	Gly Ile Ser Pro Arg Glu Ala Thr Ala Met Asp Pro Gln Gln Arg Leu	
		1140 1145 1150
	Leu Leu Glu Ala Ser Trp Glu Ala Leu Glu Asp Ala Gly Val Leu Pro	
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15	Glu Ser Leu Arg Gly Gly Asp Ala Gly Val Phe Val Gly Ala Thr Ala	
		1170 1175 1180
	Pro Glu Tyr Gly Pro Arg Leu His Glu Gly Ala Asp Gly Tyr Glu Gly	
		1185 1190 1195 1200
20	Tyr Leu Leu Thr Gly Thr Thr Ala Ser Val Ala Ser Gly Arg Ile Ala	
		1205 1210 1215
	Tyr Thr Leu Gly Thr Gly Gly Pro Ala Leu Thr Val Asp Thr Ala Cys	
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	Gly Glu Cys Gly Leu Ala Leu Ala Gly Gly Ala Thr Val Met Ser Gly	
		1250 1255 1260
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	Gly Arg Cys Met Pro Phe Ser Ala Asp Ala Asp Gly Thr Ala Trp Ser	
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	Glu Gly Val Ala Val Leu Ala Leu Glu Arg Leu Ser Asp Ala Arg Arg	
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	Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Arg Ser Ala Gln Glu	
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45	Gly Val Ile Arg Ala Ala Leu Ala Asp Ala Gly Leu Ala Pro Gly Asp	
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	Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Ala Leu Gly Asp Pro	
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50	Ile Glu Ala Ser Ala Leu Leu Ala Thr Tyr Gly Arg Glu Arg Val Gly	
		1380 1385 1390
	Asp Pro Leu Trp Leu Gly Ser Leu Lys Ser Asn Val Gly His Thr Gln	
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Ala Ala Ala Gly Ala Ala Gly Val Val Lys Met Leu Leu Ala Leu Glu
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 5 His Gly Thr Leu Pro Arg Thr Leu His Ala Asp Arg Pro Ser Thr His
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 10 Trp Pro Arg Arg Ser Asp Arg Pro Arg Arg Ala Ala Val Ser Ser Phe
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 25 Leu Phe Glu His Arg Ala Val Val Pro Cys Gly Gly Arg Gly Glu Leu
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 35 Gln Gly Ala Gln Trp Val Gly Met Gly Arg Gly Leu Tyr Ala Gly Gly
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Val Arg Leu Val Val Ala Arg Gly Gly Leu Met Gly Gly Leu Pro Val
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 40 Arg Ile Asp Leu Pro Thr Tyr Pro Phe Gln Arg Asp Arg Tyr Trp Leu
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 45 Ala Asp Ala Arg Ala Thr Glu Arg Gly Arg Ser Thr Thr Ala Gly Ile
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 Arg Tyr Arg Val Ala Trp Gln Pro Ala Val Val Asp Arg Gly Asn Pro
 2005 2010 2015
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 2020 2025 2030
 Asp Ser Gly Leu Ala Pro Ala Ile Ala Arg Glu Leu Ala Val Arg Gly
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 Ile Thr Thr Arg Glu Ala Ala Ala Val Arg Pro Asp Glu Thr Pro Ser
 2115 2120 2125
 15 Val Gly Gly Ala Gln Leu Trp Gly Leu Gly Gln Val Ala Ala Leu Glu
 2130 2135 2140
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 2145 2150 2155 2160
 20 Pro Ala Val Leu Arg Thr Phe Val Gly Ala Leu Leu Ala Gly Gly Glu
 2165 2170 2175
 25 Asn Gln Phe Ala Val Arg Pro Ser Gly Val His Val Arg Arg Val Val
 2180 2185 2190
 Pro Ala Pro Val Pro Val Pro Ala Ser Ala Arg Thr Val Thr Thr Ala
 2195 2200 2205
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 2210 2215 2220
 Val Val Pro Asp Asp Arg Trp Ser Ser Gly Thr Val Leu Ile Thr Gly
 2225 2230 2235 2240
 35 Gly Thr Gly Ala Leu Gly Ala Gln Val Ala Arg Arg Leu Ala Arg Ser
 2245 2250 2255
 Gly Ala Ala Arg Leu Leu Leu Val Gly Arg Arg Gly Ala Ala Gly Pro
 2260 2265 2270
 40 Gly Val Gly Glu Leu Val Glu Glu Leu Thr Ala Leu Gly Ser Glu Val
 2275 2280 2285
 Ala Val Glu Ala Cys Asp Val Ala Asp Arg Asp Ala Leu Ala Ala Leu
 2290 2295 2300
 45 Leu Ala Gly Leu Pro Glu Glu Arg Pro Leu Val Ala Val Leu His Ala
 2305 2310 2315 2320
 Ala Gly Val Leu Asp Asp Gly Val Leu Asp Ser Leu Thr Ser Asp Arg
 2325 2330 2335
 50 Val Asp Ala Val Leu Arg Asp Lys Val Thr Ala Ala Arg His Leu Asp
 2340 2345 2350
 Glu Leu Thr Ala Asp Leu Pro Leu Asp Ala Phe Val Leu Phe Ser Ser
 2355 2360 2365
 55

Ile Val Gly Val Trp Gly Asn Gly Gly Gln Ala Val Tyr Ala Ala Ala
 2370 2375 2380
 5 Asn Ala Ala Leu Asp Ala Leu Ala Gln Arg Arg Arg Ala Arg Gly Ala
 2385 2390 2395 2400
 Arg Ala Ala Ser Ile Ala Trp Gly Pro Trp Ala Gly Ala Gly Met Ala
 2405 2410 2415
 10 Ser Gly Thr Ala Ala Lys Ser Phe Glu Arg Asp Gly Val Thr Ala Leu
 2420 2425 2430
 Asp Pro Glu Arg Ala Leu Asp Val Leu Asp Asp Val Val Gly Ala Gly
 2435 2440 2445
 15 Gly Thr Ser Ala Ala Gly Thr His Ala Ala Gly Glu Ser Ser Leu Leu
 2450 2455 2460
 Val Ala Asp Val Asp Trp Glu Thr Phe Val Gly Arg Ser Val Thr Arg
 2465 2470 2475 2480
 20 Arg Thr Trp Ser Leu Phe Asp Gly Val Ser Ala Ala Arg Ser Ala Arg
 2485 2490 2495
 Ala Gly His Ala Ala Asp Asp Arg Ala Ala Leu Thr Pro Gly Thr Arg
 2500 2505 2510
 25 Pro Gly Asp Gly Ala Pro Gly Gly Ser Gly Gln Asp Gly Gly Glu Gly
 2515 2520 2525
 Arg Pro Trp Leu Ser Val Gly Pro Ser Pro Ala Glu Arg Arg Arg Ala
 2530 2535 2540
 30 Leu Leu Thr Leu Val Arg Ser Glu Ala Ala Gly Ile Leu Arg His Ala
 2545 2550 2555 2560
 35 Ser Ala Asp Ala Val Asp Pro Glu Leu Ala Phe Arg Ser Ala Gly Phe
 2565 2570 2575
 Asp Ser Leu Thr Val Leu Glu Leu Arg Asn Arg Leu Thr Ala Ala Thr
 2580 2585 2590
 40 Gly Leu Asn Leu Pro Asn Thr Leu Leu Phe Asp His Pro Thr Pro Leu
 2595 2600 2605
 Ser Leu Ala Ser His Leu His Asp Glu Leu Phe Gly Pro Asp Ser Glu
 2610 2615 2620
 45 Ala Glu Pro Ala Ala Ala Ala Pro Thr Pro Val Met Ala Asp Glu Arg
 2625 2630 2635 2640
 Glu Pro Ile Ala Ile Val Gly Met Ala Cys Arg Tyr Pro Gly Gly Val
 2645 2650 2655
 50 Ala Ser Pro Asp Asp Leu Trp Asp Leu Val Ala Gly Asp Gly His Thr
 2660 2665 2670
 Leu Ser Pro Phe Pro Ala Asp Arg Gly Trp Asp Val Glu Gly Leu Tyr
 2675 2680 2685
 55

Asp Pro Glu Pro Gly Val Pro Gly Lys Ser Tyr Val Arg Glu Gly Gly
 2690 2695 2700
 5 Phe Leu Arg Ser Ala Ala Glu Phe Asp Ala Glu Phe Phe Gly Ile Ser
 2705 2710 2715 2720
 Pro Arg Glu Ala Thr Ala Met Asp Pro Gln Gln Arg Leu Leu Leu Glu
 2725 2730 2735
 10 Thr Ser Trp Glu Ala Leu Glu Arg Ala Gly Ile Val Pro Asp Ser Leu
 2740 2745 2750
 Arg Gly Thr Arg Thr Gly Val Phe Ser Gly Ile Ser Gln Gln Asp Tyr
 2755 2760 2765
 15 Ala Thr Gln Leu Gly Asp Ala Ala Asp Thr Tyr Gly Gly His Val Leu
 2770 2775 2780
 Thr Gly Thr Leu Gly Ser Val Ile Ser Gly Arg Val Ala Tyr Ala Leu
 2785 2790 2795 2800
 20 Gly Leu Glu Gly Pro Ala Leu Thr Val Asp Thr Ala Cys Ser Ser Ser
 2805 2810 2815
 Leu Val Ala Leu His Leu Ala Val Gln Ser Leu Arg Arg Gly Glu Cys
 2820 2825 2830
 25 Asp Leu Ala Leu Ala Gly Gly Val Thr Val Met Ala Thr Pro Thr Val
 2835 2840 2845
 Phe Val Glu Phe Ser Arg Gln Arg Gly Leu Ala Ala Asp Gly Arg Cys
 2850 2855 2860
 30 Lys Ala Phe Ala Glu Gly Ala Asp Gly Thr Ala Trp Ala Glu Gly Val
 2865 2870 2875 2880
 35 Gly Val Leu Leu Val Glu Arg Leu Ser Asp Ala Arg Arg Asn Gly His
 2885 2890 2895
 Arg Val Leu Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp Gly Ala
 2900 2905 2910
 40 Ser Asn Gly Leu Thr Ala Pro Ser Gly Pro Ala Gln Gln Arg Val Ile
 2915 2920 2925
 Arg Glu Ala Leu Ala Asp Ala Gly Leu Val Pro Ala Asp Val Asp Val
 2930 2935 2940
 45 Val Glu Ala His Gly Thr Gly Thr Ala Leu Gly Asp Pro Ile Glu Ala
 2945 2950 2955 2960
 Gly Ala Leu Leu Ala Thr Tyr Gly Arg Glu Arg Val Gly Asp Pro Leu
 2965 2970 2975
 50 Trp Leu Gly Ser Leu Lys Ser Asn Ile Gly His Ala Gln Ala Ala Ala
 2980 2985 2990
 Gly Val Gly Gly Val Ile Lys Val Val Gln Gly Met Arg His Gly Ser
 2995 3000 3005
 55

Leu Pro Arg Thr Leu His Val Asp Ala Pro Ser Ser Lys Val Glu Trp
 3010 3015 3020

5
 Ala Ser Gly Ala Val Glu Leu Leu Thr Glu Thr Arg Ser Trp Pro Arg
 3025 3030 3035 3040

Arg Val Glu Arg Val Arg Arg Ala Ala Val Ser Ala Phe Gly Val Ser
 3045 3050 3055

10
 Gly Thr Asn Ala His Val Val Leu Glu Glu Ala Pro Ala Glu Ala Gly
 3060 3065 3070

Ser Glu His Gly Asp Gly Pro Glu Pro Glu Arg Pro Asp Ala Val Thr
 3075 3080 3085

15
 Gly Pro Leu Ser Trp Val Leu Ser Ala Arg Ser Glu Gly Ala Leu Arg
 3090 3095 3100

Ala Gln Ala Val Arg Leu Arg Glu Cys Val Glu Arg Val Gly Ala Asp
 3105 3110 3115 3120

20
 Pro Arg Asp Val Ala Gly Ser Leu Val Val Ser Arg Ala Ser Phe Gly
 3125 3130 3135

Glu Arg Ala Val Val Val Gly Arg Gly Arg Glu Glu Leu Leu Ala Gly
 3140 3145 3150

25
 Leu Asp Val Val Ala Ala Gly Ala Pro Val Gly Val Ser Ser Gly Ala
 3155 3160 3165

Gly Ala Val Val Arg Gly Ser Ala Val Arg Gly Arg Gly Val Gly Val
 3170 3175 3180

30
 Leu Phe Thr Gly Gln Gly Ala Gln Trp Val Gly Met Gly Arg Gly Leu
 3185 3190 3195 3200

35
 Tyr Ala Gly Gly Gly Val Phe Ala Glu Val Leu Asp Glu Val Leu Ser
 3205 3210 3215

Val Val Gly Glu Val Asp Gly Arg Ser Leu Arg Asp Val Met Phe Ala
 3220 3225 3230

40
 Asp Ala Asp Ser Val Leu Gly Gly Leu Leu Gly Arg Thr Glu Phe Ala
 3235 3240 3245

Gln Pro Ala Leu Phe Ala Leu Glu Val Ala Leu Phe Arg Ala Leu Glu
 3250 3255 3260

45
 Ala Arg Gly Val Glu Val Ser Val Val Leu Gly His Ser Val Gly Glu
 3265 3270 3275 3280

Val Ala Ala Ala Tyr Val Ala Gly Val Leu Ser Leu Gly Asp Ala Val
 3285 3290 3295

50
 Arg Leu Val Val Ala Arg Gly Gly Leu Met Gly Gly Leu Pro Val Gly
 3300 3305 3310

Gly Gly Met Trp Ser Val Gly Ala Ser Glu Ser Val Val Arg Gly Val
 3315 3320 3325

55

Val Glu Gly Leu Gly Glu Trp Val Ser Val Ala Ala Val Asn Gly Pro
 3330 3335 3340

5 Arg Ser Val Val Leu Ser Gly Asp Val Gly Val Leu Glu Ser Val Val
 3345 3350 3355 3360

Val Thr Leu Met Gly Asp Gly Val Glu Cys Arg Arg Leu Asp Val Ser
 3365 3370 3375

10 His Gly Phe His Ser Val Leu Met Glu Pro Val Leu Gly Glu Phe Arg
 3380 3385 3390

Gly Val Val Glu Ser Leu Glu Phe Gly Arg Val Arg Pro Gly Val Val
 3395 3400 3405

15 Val Val Ser Gly Val Ser Gly Gly Val Val Gly Ser Gly Glu Leu Gly
 3410 3415 3420

Asp Pro Gly Tyr Trp Val Arg His Ala Arg Glu Ala Val Arg Phe Ala
 20 3425 3430 3435 3440

Asp Gly Val Gly Val Val Arg Gly Leu Gly Val Gly Thr Leu Val Glu
 3445 3450 3455

25 Val Gly Pro His Gly Val Leu Thr Gly Met Ala Gly Gln Cys Leu Glu
 3460 3465 3470

Ala Gly Asp Asp Val Val Val Val Pro Ala Met Arg Arg Gly Arg Pro
 3475 3480 3485

30 Glu Arg Glu Val Phe Glu Ala Ala Leu Ala Thr Val Phe Thr Arg Asp
 3490 3495 3500

Ala Gly Leu Asp Ala Thr Thr Leu His Thr Gly Ser Thr Gly Arg Arg
 3505 3510 3515 3520

35 Ile Asp Leu Pro Thr Tyr Pro Phe Gln His Asn Arg Tyr Trp Ala Thr
 3525 3530 3535

Gly Ser Val Thr Gly Ala Thr Gly Thr Ser Ala Ala Ala Arg Phe Gly
 3540 3545 3550

40 Leu Glu Trp Lys Asp His Pro Phe Leu Ser Gly Ala Thr Pro Ile Ala
 3555 3560 3565

Gly Ser Gly Ala Leu Leu Leu Thr Gly Arg Val Gly Leu Ala Ala His
 45 3570 3575 3580

Pro Trp Leu Ala Asp His Ala Ile Ser Gly Thr Val Leu Leu Pro Gly
 3585 3590 3595 3600

50 Thr Ala Ile Ala Asp Leu Leu Leu Arg Ala Val Glu Glu Val Gly Ala
 3605 3610 3615

Gly Gly Val Glu Glu Leu Thr Leu His Glu Pro Leu Leu Leu Pro Glu
 3620 3625 3630

55 Arg Gly Gly Leu His Val Gln Val Leu Val Glu Ala Ala Asp Glu Gln
 3635 3640 3645

5 Gly Arg Arg Ala Val Ala Val Ala Ala Arg Pro Glu Gly Pro Gly Arg
 3650 3655 3660
 Asp Gly Glu Glu Gln Glu Trp Thr Arg His Ala Glu Gly Val Leu Thr
 3665 3670 3675 3680
 10 Ser Thr Glu Thr Ala Val Pro Asp Met Gly Trp Ala Ala Gly Ala Trp
 3685 3690 3695
 Pro Pro Pro Gly Ala Glu Pro Ile Asp Val Glu Glu Leu Tyr Asp Ala
 3700 3705 3710
 15 Phe Ala Ala Asp Gly Tyr Gly Tyr Gly Pro Ala Phe Thr Ala Leu Ser
 3715 3720 3725
 Gly Val Trp Arg Leu Gly Asp Glu Leu Phe Ala Glu Val Arg Arg Pro
 3730 3735 3740
 20 Ala Gly Gly Ala Gly Thr Thr Gly Asp Gly Phe Gly Val His Pro Ala
 3745 3750 3755 3760
 Leu Phe Asp Ala Ala Leu His Pro Trp Arg Ala Gly Gly Leu Leu Pro
 3765 3770 3775
 25 Asp Thr Gly Gly Thr Thr Trp Ala Pro Phe Ser Trp Gln Gly Ile Ala
 3780 3785 3790
 Leu His Thr Thr Gly Ala Glu Thr Leu Arg Val Arg Leu Ala Pro Ala
 3795 3800 3805
 30 Ala Gly Gly Thr Glu Ser Ala Phe Ser Val Gln Ala Ala Asp Pro Ala
 3810 3815 3820
 Gly Thr Pro Val Leu Thr Leu Asp Ala Leu Leu Leu Arg Pro Val Thr
 3825 3830 3835 3840
 35 Leu Gly Arg Ala Asp Ala Pro Gln Pro Leu Tyr Arg Val Asp Trp Gln
 3845 3850 3855
 Pro Val Gly Gln Gly Thr Glu Ala Ser Gly Ala Gln Gly Trp Thr Val
 3860 3865 3870
 40 Leu Gly Gln Ala Ala Ala Glu Thr Val Ala Gln Pro Ala Ala His Ala
 3875 3880 3885
 Asp Leu Thr Ala Leu Arg Thr Ala Val Ala Ala Ala Gly Thr Pro Val
 3890 3895 3900
 45 Pro Arg Leu Val Val Val Ser Pro Val Asp Thr Arg Leu Asp Glu Gly
 3905 3910 3915 3920
 50 Pro Val Leu Ala Asp Ala Glu Ala Arg Ala Arg Ala Gly Asp Gly Trp
 3925 3930 3935
 Asp Asp Asp Pro Leu Arg Val Ala Leu Gly Arg Gly Leu Thr Leu Val
 3940 3945 3950
 55 Arg Glu Trp Val Glu Asp Glu Arg Leu Ala Asp Ser Arg Leu Val Val
 3955 3960 3965

5 Leu Thr Arg Gly Ala Val Ala Ala Gly Pro Gly Asp Val Pro Asp Leu
 3970 3975 3980
 Thr Gly Ala Ala Leu Trp Gly Leu Leu Arg Ser Ala Gln Ser Glu Tyr
 3985 3990 3995 4000
 10 Pro Asp Arg Phe Thr Leu Ile Asp Val Asp Asp Ser Pro Glu Ser Arg
 4005 4010 4015
 Ala Ala Leu Pro Arg Ala Leu Gly Ser Ala Glu Arg Gln Leu Ala Leu
 4020 4025 4030
 15 Arg Thr Gly Asp Val Leu Ala Pro Ala Leu Val Pro Met Ala Thr Arg
 4035 4040 4045
 Pro Ala Glu Thr Thr Pro Ala Thr Ala Val Ala Ser Ala Thr Thr Gln
 4050 4055 4060
 20 Thr Gln Val Thr Ala Pro Ala Pro Asp Asp Pro Ala Ala Asp Ala Val
 4065 4070 4075 4080
 Phe Asp Pro Ala Gly Thr Val Leu Ile Thr Gly Gly Thr Gly Ala Leu
 4085 4090 4095
 25 Gly Arg Arg Val Ala Ser His Leu Ala Arg Arg Tyr Gly Val Arg His
 4100 4105 4110
 Met Leu Leu Val Ser Arg Arg Gly Pro Asp Ala Pro Glu Ala Gly Pro
 4115 4120 4125
 30 Leu Glu Arg Glu Leu Ala Gly Leu Gly Val Thr Ala Thr Phe Leu Ala
 4130 4135 4140
 Cys Asp Leu Thr Asp Ile Glu Ala Val Arg Lys Ala Val Ala Ala Val
 4145 4150 4155 4160
 35 Pro Ser Asp His Pro Leu Thr Gly Val Val His Thr Ala Gly Val Leu
 4165 4170 4175
 Asp Asp Gly Ala Leu Thr Gly Leu Thr Arg Gln Arg Leu Asp Thr Val
 4180 4185 4190
 40 Leu Arg Pro Lys Ala Asp Ala Val Arg Asn Leu His Glu Ala Thr Leu
 4195 4200 4205
 Asp Arg Pro Leu Arg Ala Phe Val Leu Phe Ser Ala Ala Ala Gly Leu
 4210 4215 4220
 45 Leu Gly Arg Pro Gly Gln Ala Ser Tyr Ala Ala Ala Asn Ala Val Leu
 4225 4230 4235 4240
 50 Asp Ala Leu Ala Gly Ala Arg Arg Ala Ala Gly Leu Pro Ala Val Ser
 4245 4250 4255
 Leu Ala Trp Gly Leu Trp Asp Glu Gln Thr Gly Met Ala Gly Gly Leu
 4260 4265 4270
 55 Asp Glu Met Ala Leu Arg Val Leu Arg Arg Asp Gly Ile Ala Ala Met
 4275 4280 4285

5 Pro Pro Glu Gln Gly Leu Glu Leu Leu Asp Leu Ala Leu Thr Gly His
 4290 4295 4300
 Arg Asp Gly Pro Ala Val Leu Val Pro Leu Leu Leu Asp Gly Ala Ala
 4305 4310 4315 4320
 10 Leu Arg Arg Thr Ala Lys Glu Arg Gly Ala Ala Thr Met Ser Pro Leu
 4325 4330 4335
 Leu Arg Ala Leu Leu Pro Ala Ala Leu Arg Arg Ser Gly Gly Ala Gly
 4340 4345 4350
 15 Ala Pro Ala Ala Ala Asp Arg His Gly Lys Glu Ala Asp Pro Gly Ala
 4355 4360 4365
 Gly Arg Leu Ala Gly Met Val Ala Leu Glu Ala Ala Glu Arg Ser Ala
 4370 4375 4380
 20 Ala Val Leu Glu Leu Val Thr Glu Gln Val Ala Glu Val Leu Gly Tyr
 4385 4390 4395 4400
 Ala Ser Ala Ala Glu Ile Glu Pro Glu Arg Pro Phe Arg Glu Ile Gly
 4405 4410 4415
 25 Val Asp Ser Leu Ala Ala Val Glu Leu Arg Asn Arg Leu Ser Arg Leu
 4420 4425 4430
 Val Gly Leu Arg Leu Pro Thr Thr Leu Ser Phe Asp His Pro Thr Pro
 4435 4440 4445
 30 Lys Asp Met Ala Gln His Ile Asp Gly Gln Leu Pro Arg Pro Ala Gly
 4450 4455 4460
 Ala Ser Pro Ala Asp Ala Ala Leu Glu Gly Ile Gly Asp Leu Ala Arg
 4465 4470 4475 4480
 35 Ala Val Ala Leu Leu Gly Thr Gly Asp Ala Arg Arg Ala Glu Val Arg
 4485 4490 4495
 Glu Gln Leu Val Gly Leu Leu Ala Ala Leu Asp Pro Pro Gly Arg Thr
 4500 4505 4510
 40 Gly Thr Ala Ala Pro Gly Val Pro Ser Gly Ala Asp Gly Ala Glu Pro
 4515 4520 4525
 Thr Val Thr Asp Arg Leu Asp Glu Ala Thr Asp Asp Glu Ile Phe Ala
 4530 4535 4540
 45 Phe Leu Asp Glu Gln Leu
 4545 4550

50 (2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 1996 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: peptide

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(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

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Met Thr Ala Glu Asn Asp Lys Ile Arg Ser Tyr Leu Lys Arg Ala Thr
1      5      10      15

Ala Glu Leu His Arg Thr Lys Ser Arg Leu Ala Glu Val Glu Ser Ala
20      25      30

Ser Arg Glu Pro Ile Ala Ile Val Gly Met Ala Cys Arg Tyr Pro Gly
35      40      45

Gly Val Ala Ser Pro Asp Asp Leu Trp Asp Leu Val Ala Ala Gly Thr
50      55      60

Asp Ala Val Ser Ala Phe Pro Val Asp Arg Gly Trp Asp Val Glu Gly
65      70      75      80
Leu Tyr Asp Pro Asp Pro Glu Ala Val Gly Arg Ser Tyr Val Arg Glu
85      90      95

Gly Gly Phe Leu His Ser Ala Ala Glu Phe Asp Ala Glu Phe Phe Gly
100      105      110

Ile Ser Pro Arg Glu Ala Ala Ala Met Asp Pro Gln Gln Arg Leu Leu
115      120      125

Leu Glu Thr Ser Trp Glu Ala Leu Glu Arg Ala Gly Ile Val Pro Ala
130      135      140

Ser Leu Arg Gly Thr Arg Thr Gly Val Phe Thr Gly Val Met Tyr Asp
145      150      155      160

Asp Tyr Gly Ser Arg Phe Asp Ser Ala Pro Pro Glu Tyr Glu Gly Tyr
165      170      175

Leu Val Asn Gly Ser Ala Gly Ser Ile Ala Ser Gly Arg Val Ala Tyr
180      185      190

Ala Leu Gly Leu Glu Gly Pro Ala Leu Thr Val Asp Thr Ala Cys Ser
195      200      205

Ser Ser Leu Val Ala Leu His Leu Ala Val Gln Ser Leu Arg Arg Gly
210      215      220

Glu Cys Asp Leu Ala Leu Ala Gly Gly Val Thr Val Met Ala Thr Pro
225      230      235      240

Thr Val Leu Val Glu Phe Ser Arg Gln Arg Gly Leu Ala Ala Asp Gly
245      250      255

Arg Cys Lys Ala Phe Ala Glu Gly Ala Asp Gly Thr Ala Trp Ala Glu
260      265      270

Gly Val Gly Val Leu Leu Val Glu Arg Leu Ser Asp Ala Arg Arg Asn
275      280      285

Gly His Arg Val Leu Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp

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	290	295	300
5	Gly Ala Ser Asn Gly Leu Thr Ala Pro Ser Gly Pro Ala Gln Gln Arg 305 310 315 320		
	Val Ile Arg Glu Ala Leu Ala Asp Ala Gly Leu Thr Pro Ala Asp Val 325 330 335		
10	Asp Ala Val Glu Ala His Gly Thr Gly Thr Pro Leu Gly Asp Pro Ile 340 345 350		
	Glu Ala Gly Ala Leu Leu Ala Thr Tyr Gly Ser Glu Arg Gln Gly Gln 355 360 365		
15	Gly Pro Leu Trp Leu Gly Ser Leu Lys Ser Asn Ile Gly His Ala Gln 370 375 380		
	Ala Ala Ala Gly Val Gly Gly Val Ile Lys Val Val Gln Ala Met Arg 385 390 395 400		
20	His Gly Ser Leu Pro Arg Thr Leu His Val Asp Ala Pro Ser Ser Lys 405 410 415		
	Val Glu Trp Ala Ser Gly Ala Val Glu Leu Leu Thr Glu Thr Arg Ser 420 425 430		
25	Trp Pro Arg Arg Val Glu Arg Val Arg Ala Ala Val Ser Ala Phe 435 440 445		
	Gly Val Ser Gly Thr Asn Ala His Val Val Leu Glu Glu Ala Pro Ala 450 455 460		
30	Glu Ala Gly Ser Glu His Gly Asp Gly Pro Glu Pro Glu Arg Pro Asp 465 470 475 480		
	Ala Val Thr Gly Pro Leu Ser Trp Val Leu Ser Ala Arg Ser Glu Gly 485 490 495		
35	Ala Leu Arg Ala Gln Ala Val Arg Leu Arg Glu Cys Val Glu Arg Val 500 505 510		
	Gly Ala Asp Pro Arg Asp Val Ala Gly Ser Leu Val Val Ser Arg Ala 515 520 525		
40	Ser Phe Gly Glu Arg Ala Val Val Val Gly Arg Gly Arg Glu Glu Leu 530 535 540		
	Leu Ala Gly Leu Asp Val Val Ala Ala Gly Ala Pro Val Gly Val Ser 545 550 555 560		
45	Gly Gly Val Ser Ser Gly Ala Gly Ala Val Val Arg Gly Ser Ala Val 565 570 575		
	Arg Gly Arg Gly Val Gly Val Leu Phe Thr Gly Gln Gly Ala Gln Trp 580 585 590		
50	Val Gly Met Gly Arg Gly Leu Tyr Ala Gly Gly Gly Val Phe Ala Glu 595 600 605		
55	Val Leu Asp Glu Val Leu Ser Val Val Gly Glu Val Gly Gly Trp Ser		

	610	615	620
5	Leu Arg Asp Val Met 625	Phe Gly Asp Val 630	Val Asp Ala Gly Ala Gly 635 640
	Ala Asp Ala Gly Val 645	Gly Ser Gly Val 650	Gly Gly Leu Leu Gly 655
10	Arg Thr Glu Phe Ala Gln 660	Pro Ala Leu Phe 665	Ala Leu Glu Val Ala Leu 670
	Phe Arg Ala Leu Glu Ala 675	Arg Gly Val Glu Val 680	Ser Val Val Leu Gly 685
15	His Ser Val Gly Glu Val 690	Ala Ala Ala Tyr 695	Val Ala Gly Val Leu Ser 700
	Leu Gly Asp Ala Val 705	Arg Leu Val Val 710	Ala Arg Gly Gly Leu Met Gly 715 720
20	Gly Leu Pro Val Gly 725	Gly Gly Met Trp 730	Ser Val Gly Ala Ser Glu Ser 735
	Val Val Arg Gly Val 740	Val Glu Gly Leu 745	Gly Glu Trp Val Ser Val Ala 750
25	Ala Val Asn Gly Pro 755	Arg Ser Val Val 760	Leu Ser Gly Asp Val Gly Val 765
	Leu Glu Ser Val Val 770	Ala Ser Leu Met 775	Gly Asp Gly Val Glu Cys Arg 780
30	Arg Leu Asp Val Ser 785	His Gly Phe His 790	Ser Val Leu Met Glu Pro Val 795 800
	Leu Gly Glu Phe 805	Arg Gly Val Val 810	Ser Leu Glu Phe Gly Arg Val 815
35	Arg Pro Gly Val Val 820	Val Val Ser 825	Ser Val Ser Gly Gly Val Val Gly 830
	Ser Gly Glu Leu Gly 835	Asp Pro Gly Tyr 840	Trp Val Arg His Ala Arg Glu 845
40	Ala Val Arg Phe Ala 850	Asp Gly Val Gly 855	Val Val Arg Gly Leu Gly Val 860
	Gly Thr Leu Val Glu 865	Val Gly Pro His 870	Gly Val Leu Thr Gly Met Ala 875 880
45	Gly Glu Cys Leu Gly 885	Ala Gly Asp Asp 890	Val Val Val Val Pro Ala Met 895
50	Arg Arg Gly Arg Ala 900	Glu Arg Glu Val 905	Phe Glu Ala Ala Leu Ala Thr 910
	Val Phe Thr Arg Asp 915	Ala Gly Leu Asp 920	Ala Thr Thr Leu His Thr Gly 925
55	Ser Thr Gly Arg Arg 930	Ile Asp Leu Pro 935	Thr Tyr Pro Phe Gln His Asp 940

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	930	935	940
5	Arg Tyr Trp Leu Ala Ala Pro Ser Arg Pro Arg Thr Asp Gly Leu Ser 945 950 955 960		
	Ala Ala Gly Leu Arg Glu Val Glu His Pro Leu Leu Thr Ala Ala Val 965 970 975		
10	Glu Leu Pro Gly Thr Asp Thr Glu Val Trp Thr Gly Arg Ile Ser Ala 980 985 990		
	Ala Asp Leu Pro Trp Leu Ala Asp His Leu Val Trp Asp Arg Gly Val 995 1000 1005		
15	Val Pro Gly Thr Ala Leu Leu Glu Thr Val Leu Gln Val Gly Ser Arg 1010 1015 1020		
	Ile Gly Leu Pro Arg Val Ala Glu Leu Val Leu Glu Thr Pro Leu Thr 1025 1030 1035 1040		
20	Trp Thr Ser Asp Arg Pro Leu Gln Val Arg Ile Val Val Thr Ala Ala 1045 1050 1055		
	Ala Thr Ala Pro Gly Gly Ala Arg Glu Leu Thr Leu His Ser Arg Pro 1060 1065 1070		
25	Glu Pro Val Ala Ala Ser Ser Ser Ser Pro Ser Pro Ala Ser Pro Arg 1075 1080 1085		
	His Leu Thr Ala Gln Glu Ser Asp Asp Asp Trp Thr Arg His Ala Ser 1090 1095 1100		
30	Gly Leu Leu Ala Pro Ala Ala Gly Leu Ala Asp Asp Phe Ala Glu Leu 1105 1110 1115 1120		
	Thr Gly Ala Trp Pro Pro Val Gly Ala Glu Pro Leu Asp Leu Ala Gly 1125 1130 1135		
35	Gln Tyr Pro Leu Phe Ala Ala Ala Gly Val Arg Tyr Glu Gly Ala Phe 1140 1145 1150		
	Arg Gly Leu Arg Ala Ala Trp Arg Arg Gly Asp Glu Val Phe Ala Asp 1155 1160 1165		
40	Val Arg Leu Pro Asp Ala His Ala Val Asp Ala Asp Arg Tyr Gly Val 1170 1175 1180		
	His Pro Ala Leu Leu Asp Ala Val Leu His Pro Ile Ala Ser Leu Asp 1185 1190 1195 1200		
45	Pro Leu Gly Asp Gly Gly His Gly Leu Leu Pro Phe Ser Trp Thr Asp 1205 1210 1215		
50	Val Gln Gly His Gly Ala Gly Gly His Ala Leu Arg Val Arg Val Ala 1220 1225 1230		
	Ala Val Asp Gly Gly Ala Val Ser Val Thr Ala Ala Asp His Ala Gly 1235 1240 1245		
55	Asn Pro Val Leu Ser Ala Arg Ser Leu Ala Leu Arg Arg Ile Thr Ala		

	1250	1255	1260
5	Asp Arg Leu Pro Ala Ala Pro Val Ala Pro Leu Tyr Arg Val Asp Trp 1265	1270	1275 1280
	Leu Pro Phe Pro Gly Pro Val Pro Val Ser Ala Gly Gly Arg Trp Ala 1285	1290	1295
10	Val Val Gly Pro Glu Ala Glu Ala Thr Ala Ala Gly Leu Arg Ala Val 1300	1305	1310
	Gly Leu Asp Val Arg Thr His Ala Leu Pro Leu Gly Glu Pro Leu Pro 1315	1320	1325
15	Pro Gln Ala Gly Thr Asp Ala Glu Val Ile Ile Leu Asp Leu Thr Thr 1330	1335	1340
	Thr Ala Ala Gly Arg Thr Ala Ser Asp Gly Gly Arg Leu Ser Leu Leu 1345	1350	1355 1360
20	Asp Glu Val Arg Ala Thr Val Arg Arg Thr Leu Glu Ala Val Gln Ala 1365	1370	1375
	Arg Leu Ala Asp Thr Glu Thr Ala Pro Asp Val Asp Val Arg Thr Ala 1380	1385	1390
25	Ala Arg Pro Arg Thr Ala Ala Arg Thr Ser Pro Arg Val Asp Thr Arg 1395	1400	1405
	Thr Gly Ala Arg Thr Ala Asp Gly Pro Arg Leu Val Val Leu Thr Arg 1410	1415	1420
	Gly Ala Ala Gly Pro Glu Gly Gly Ala Ala Asp Pro Ala Gly Ala Ala 1425	1430	1435 1440
35	Val Trp Gly Leu Val Arg Val Ala Gln Ala Glu Gln Pro Gly Arg Phe 1445	1450	1455
	Thr Leu Val Asp Val Asp Gly Thr Gln Ala Ser Leu Arg Ala Leu Pro 1460	1465	1470
40	Gly Leu Leu Ala Thr Asp Ala Gly Gln Ser Ala Val Arg Asp Gly Arg 1475	1480	1485
	Val Thr Val Pro Arg Leu Val Pro Val Ala Asp Pro Val Pro His Gly 1490	1495	1500
45	Gly Gly Thr Ala Ala Asp Gly Thr Gly Ala Gly Glu Pro Ser Ala Thr 1505	1510	1515 1520
	Leu Asp Pro Glu Gly Thr Val Leu Ile Thr Gly Gly Thr Gly Ala Leu 1525	1530	1535
50	Ala Ala Glu Thr Ala Arg His Leu Val Asp Arg His Lys Val Arg His 1540	1545	1550
	Leu Leu Leu Val Gly Arg Arg Gly Pro Asp Ala Pro Gly Val Asp Arg 1555	1560	1565
55	Leu Val Ala Glu Leu Thr Glu Ser Gly Ala Glu Val Ala Val Arg Ala		

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	1570	1575	1580
5	Cys Asp Val Thr Asp Arg Asp Ala Leu Arg Arg Leu Leu Asp Ala Leu 1585 1590 1595 1600		
	Pro Asp Glu His Pro Leu Thr Cys Val Val His Thr Ala Gly Val Leu 1605 1610 1615		
10	Asp Asp Gly Val Leu Ser Ala Gln Thr Ala Glu Arg Ile Asp Thr Val 1620 1625 1630		
	Leu Arg Pro Lys Ala Asp Ala Ala Val His Leu Asp Glu Leu Thr Arg 1635 1640 1645		
15	Glu Ile Gly Arg Val Pro Leu Val Leu Tyr Ser Ser Val Ser Ala Thr 1650 1655 1660		
	Leu Gly Ser Ala Gly Gln Ala Gly Tyr Ala Ala Ala Asn Ala Phe Met 1665 1670 1675 1680		
20	Asp Ala Leu Ala Ala Arg Arg Cys Ala Ala Gly His Pro Ala Leu Ser 1685 1690 1695		
	Leu Gly Trp Gly Trp Trp Ser Gly Val Gly Leu Ala Thr Gly Leu Asp 1700 1705 1710		
25	Gly Ala Asp Ala Ala Arg Val Arg Arg Ser Gly Leu Ala Pro Leu Asp 1715 1720 1725		
	Ala Gly Ala Ala Leu Asp Leu Leu Asp Arg Ala Leu Thr Arg Pro Glu 1730 1735 1740		
30	Pro Ala Leu Leu Pro Val Arg Leu Asp Leu Arg Ala Ala Ala Gly Ala 1745 1750 1755 1760		
	Thr Ala Leu Pro Glu Val Leu Arg Asp Leu Ala Gly Val Pro Ala Asp 1765 1770 1775		
	Ala Arg Ser Thr Pro Gly Ala Ala Ala Gly Thr Gly Asp Glu Asp Gly 1780 1785 1790		
40	Ala Val Arg Pro Ala Pro Ala Pro Ala Asp Ala Ala Gly Thr Leu Ala 1795 1800 1805		
	Ala Arg Leu Ala Gly Arg Ser Ala Pro Glu Arg Thr Ala Leu Leu Leu 1810 1815 1820		
45	Asp Leu Val Arg Thr Glu Val Ala Ala Val Leu Gly His Gly Asp Pro 1825 1830 1835 1840		
	Ala Ala Ile Gly Ala Ala Arg Thr Phe Lys Asp Ala Gly Phe Asp Ser 1845 1850 1855		
50	Leu Thr Ala Val Asp Leu Arg Asn Arg Leu Asn Thr Arg Thr Gly Leu 1860 1865 1870		
	Arg Leu Pro Ala Thr Leu Val Phe Asp His Pro Thr Pro Leu Ala Leu 1875 1880 1885		
55	Ala Glu Leu Leu Leu Asp Gly Leu Glu Ala Ala Gly Pro Ala Glu Pro		

	1890	1895	1900
5	Ala Ala Glu Val Pro Asp Glu Ala Ala Gly Ala Glu Thr Leu Ser Gly 1905 1910 1915 1920		
	Val Ile Asp Arg Leu Glu Arg Ser Leu Ala Ala Thr Asp Asp Gly Asp 1925 1930 1935		
10	Ala Arg Val Arg Ala Ala Arg Arg Leu Arg Gly Leu Leu Asp Ala Leu 1940 1945 1950		
	Pro Ala Gly Pro Gly Ala Ala Ser Gly Pro Asp Ala Gly Glu His Ala 1955 1960 1965		
15	Pro Gly Arg Gly Asp Val Val Ile Asp Arg Leu Arg Ser Ala Ser Asp 1970 1975 1980		
	Asp Asp Leu Phe Asp Leu Leu Asp Ser Asp Phe Gln 1985 1990 1995		
20			

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 3724 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Met Ser Ala Thr Asn Glu Glu Lys Leu Arg Glu Tyr Leu Arg Arg Ala 1 5 10 15	
Met Ala Asp Leu His Ser Ala Arg Glu Arg Leu Arg Glu Val Glu Ser 20 25 30	
Ala Ser Arg Glu Pro Ile Ala Ile Val Gly Met Ala Cys Arg Tyr Pro 35 40 45	
Gly Gly Val Ala Ser Pro Glu Glu Leu Trp Asp Leu Val Ala Ala Gly 50 55 60	
Thr Asp Ala Ile Ser Pro Phe Pro Val Asp Arg Gly Trp Asp Ala Glu 65 70 75 80	
Gly Leu Tyr Asp Pro Glu Pro Gly Val Pro Gly Lys Ser Tyr Val Arg 85 90 95	
Glu Gly Gly Phe Leu His Ser Ala Ala Glu Phe Asp Ala Glu Phe Phe 100 105 110	
Gly Ile Ser Pro Arg Glu Ala Ala Met Asp Pro Gln Gln Arg Leu 115 120 125	
Leu Leu Glu Thr Ser Trp Glu Ala Leu Glu Arg Ala Gly Ile Val Pro 130 135 140	

	Ala	Ser	Leu	Arg	Gly	Thr	Arg	Thr	Gly	Val	Phe	Thr	Gly	Val	Met	Tyr
	145						150				155					160
5	His	Asp	Tyr	Gly	Ser	His	Gln	Val	Gly	Thr	Ala	Ala	Asp	Pro	Ser	Gly
					165					170						175
	Gln	Leu	Gly	Leu	Gly	Thr	Ala	Gly	Ser	Val	Ala	Ser	Gly	Arg	Val	Ala
				180					185						190	
10	Tyr	Thr	Leu	Gly	Leu	Gln	Gly	Pro	Ala	Val	Thr	Met	Asp	Thr	Ala	Cys
			195					200					205			
	Ser	Ser	Ser	Leu	Val	Ala	Leu	His	Leu	Ala	Val	Gln	Ser	Leu	Arg	Arg
15			210				215					220				
	Gly	Glu	Cys	Asp	Leu	Ala	Leu	Ala	Gly	Gly	Ala	Thr	Val	Leu	Ala	Thr
	225					230					235					240
	Pro	Thr	Val	Phe	Val	Glu	Phe	Ser	Arg	Gln	Arg	Gly	Leu	Ala	Ala	Asp
20					245					250					255	
	Gly	Arg	Cys	Lys	Ala	Phe	Ala	Glu	Gly	Ala	Asp	Gly	Thr	Ala	Trp	Ala
				260					265						270	
	Glu	Gly	Ala	Gly	Val	Leu	Leu	Val	Glu	Arg	Leu	Ser	Asp	Ala	Arg	Arg
25			275					280					285			
	Asn	Gly	His	Arg	Val	Leu	Ala	Val	Val	Arg	Gly	Ser	Ala	Val	Asn	Gln
		290					295					300				
30	Asp	Gly	Ala	Ser	Asn	Gly	Leu	Thr	Ala	Pro	Ser	Gly	Pro	Ala	Gln	Gln
	305					310					315					320
	Arg	Val	Ile	Arg	Asp	Ala	Leu	Ala	Asp	Ala	Gly	Leu	Thr	Pro	Ala	Asp
					325					330					335	
35	Val	Asp	Ala	Val	Glu	Ala	His	Gly	Thr	Gly	Thr	Pro	Leu	Gly	Asp	Pro
				340					345					350		
	Ile	Glu	Ala	Gly	Ala	Leu	Met	Ala	Thr	Tyr	Gly	Ser	Glu	Arg	Val	Gly
40			355					360					365			
	Asp	Pro	Leu	Trp	Leu	Gly	Ser	Leu	Lys	Ser	Asn	Ile	Gly	His	Thr	Gln
		370					375					380				
	Ala	Ala	Ala	Gly	Ala	Ala	Gly	Val	Ile	Lys	Met	Val	Gln	Ala	Leu	Arg
45						390					395					400
	Gln	Ser	Glu	Leu	Pro	Arg	Thr	Leu	His	Val	Asp	Ala	Pro	Ser	Ala	Lys
					405					410					415	
	Val	Glu	Trp	Asp	Ala	Gly	Ala	Val	Gln	Leu	Leu	Thr	Gly	Val	Arg	Pro
50				420					425					430		
	Trp	Pro	Arg	Arg	Glu	His	Arg	Pro	Arg	Arg	Ala	Ala	Val	Ser	Ala	Phe
			435					440					445			
55	Gly	Val	Ser	Gly	Thr	Asn	Ala	His	Val	Ile	Ile	Glu	Glu	Pro	Pro	Ala
	450						455					460				

Ala Gly Asp Thr Ser Pro Ala Gly Asp Thr Pro Glu Pro Gly Glu Ala
 465 470 475 480
 5 Thr Ala Ser Pro Ser Thr Ala Ala Gly Pro Ser Ser Pro Ser Ala Val
 485 490 495
 Ala Gly Pro Leu Ser Pro Ser Ser Pro Ala Val Val Trp Pro Leu Ser
 500 505 510
 10 Ala Glu Thr Ala Pro Ala Leu Arg Ala Gln Ala Ala Arg Leu Arg Ala
 515 520 525
 His Leu Glu Arg Leu Pro Gly Thr Ser Pro Thr Asp Ile Gly His Ala
 530 535 540
 15 Leu Ala Ala Glu Arg Ala Ala Leu Thr Arg Arg Val Val Leu Leu Gly
 545 550 555 560
 Asp Asp Gly Ala Pro Val Asp Ala Leu Ala Ala Leu Ala Ala Gly Glu
 565 570 575
 20 Thr Thr Pro Asp Ala Val His Gly Thr Ala Ala Asp Ile Arg Arg Val
 580 585 590
 25 Ala Phe Val Phe Pro Gly Gln Gly Ser Gln Trp Ala Gly Met Gly Ala
 595 600 605
 Glu Leu Leu Asp Thr Ala Pro Ala Phe Ala Ala Glu Leu Asp Arg Cys
 610 615 620
 30 Gln Gly Ala Leu Ser Pro Tyr Val Asp Trp Asn Leu Ala Asp Val Leu
 625 630 635 640
 Arg Gly Ala Pro Ala Ala Pro Gly Leu Asp Arg Val Asp Val Val Gln
 645 650 655
 35 Pro Ala Thr Phe Ala Val Met Val Gly Leu Ala Ala Leu Trp Arg Ser
 660 665 670
 Leu Gly Val Glu Pro Ala Ala Val Ile Gly His Ser Gln Gly Glu Ile
 675 680 685
 40 Ala Ala Ala Cys Val Ala Gly Ala Leu Ser Leu Glu Asp Ala Ala Arg
 690 695 700
 Ile Val Ala Leu Arg Ser Gln Val Ile Ala Arg Glu Leu Ala Gly Arg
 705 710 715 720
 45 Gly Gly Met Ala Ser Val Ala Leu Pro Ala Ala Glu Val Glu Ala Arg
 725 730 735
 50 Leu Ala Gly Gly Val Glu Ile Ala Ala Val Asn Gly Pro Gly Ser Thr
 740 745 750
 Val Val Cys Gly Glu Pro Gly Ala Leu Glu Ala Leu Leu Val Thr Leu
 755 760 765
 55 Glu Ser Glu Gly Thr Arg Val Arg Arg Ile Asp Val Asp Tyr Ala Ser
 770 775 780

5 His Ser His Tyr Val Glu Ser Ile Arg Ala Glu Leu Ala Thr Val Leu
 785 790 795 800
 Gly Pro Val Arg Pro Arg Arg Gly Asp Val Pro Phe Tyr Ser Thr Val
 805 810 815
 10 Glu Ala Ala Leu Leu Asp Thr Ala Thr Leu Asp Ala Asp Tyr Trp Tyr
 820 825 830
 Arg Asn Leu Arg Leu Pro Val Arg Phe Glu Pro Thr Val Arg Ala Met
 835 840 845
 15 Leu Asp Asp Gly Val Asp Ala Phe Val Glu Cys Ser Ala His Pro Val
 850 855 860
 Leu Thr Val Gly Val Arg Gln Thr Val Glu Ser Ala Gly Gly Ala Val
 865 870 875 880
 20 Pro Ala Leu Ala Ser Leu Arg Arg Asp Glu Gly Gly Leu Arg Arg Phe
 885 890 895
 Leu Thr Ser Ala Ala Glu Ala Gln Val Val Gly Val Pro Val Asp Trp
 900 905 910
 25 Ala Thr Leu Arg Pro Gly Ala Gly Arg Val Asp Leu Pro Thr Tyr Ala
 915 920 925
 Phe Gln Arg Glu Arg His Trp Val Gly Pro Ala Arg Pro Asp Ser Ala
 930 935 940
 30 Ala Thr Ala Ala Thr Thr Gly Asp Asp Ala Pro Glu Pro Gly Asp Arg
 945 950 955 960
 Leu Gly Tyr His Val Ala Trp Lys Gly Leu Arg Ser Thr Thr Gly Gly
 965 970 975
 35 Trp Arg Pro Gly Leu Arg Leu Leu Ile Val Pro Thr Gly Asp Gln Tyr
 980 985 990
 Thr Ala Leu Ala Asp Thr Leu Glu Gln Ala Val Ala Ser Phe Gly Gly
 995 1000 1005
 40 Thr Val Arg Arg Val Ala Phe Asp Pro Ala Arg Thr Gly Arg Ala Glu
 1010 1015 1020
 Leu Phe Gly Leu Leu Glu Thr Glu Ile Asn Gly Asp Thr Ala Val Thr
 1025 1030 1035 1040
 Gly Val Val Ser Leu Leu Gly Leu Cys Thr Asp Gly Arg Pro Asp His
 1045 1050 1055
 50 Pro Ala Val Pro Val Ala Val Thr Ala Thr Leu Ala Leu Val Gln Ala
 1060 1065 1070
 Leu Ala Asp Leu Gly Ser Thr Ala Pro Leu Trp Thr Val Thr Cys Gly
 1075 1080 1085
 55 Ala Val Ala Thr Ala Pro Asp Glu Leu Pro Cys Thr Ala Gly Ala Gln
 1090 1095 1100

5 Leu Trp Gly Leu Gly Arg Val Ala Ala Leu Glu Leu Pro Glu Val Trp
 1105 1110 1115 1120
 Gly Gly Leu Ile Asp Leu Pro Ala Arg Pro Asp Ala Arg Val Leu Asp
 1125 1130 1135
 10 Arg Leu Ala Gly Val Leu Ala Glu Pro Gly Gly Glu Asp Gln Ile Ala
 1140 1145 1150
 Val Arg Met Ala Gly Val Phe Gly Arg Arg Val Leu Arg Asn Pro Ala
 1155 1160 1165
 15 Asp Ser Arg Pro Pro Ala Trp Arg Ala Arg Gly Thr Val Leu Ile Ala
 1170 1175 1180
 Gly Asp Leu Thr Thr Val Pro Gly Arg Leu Val Arg Ser Leu Leu Glu
 1185 1190 1195 1200
 20 Asp Gly Ala Asp Arg Val Val Leu Ala Gly Pro Asp Ala Pro Ala Gln
 1205 1210 1215
 Ala Ala Ala Ala Gly Leu Thr Gly Val Ser Leu Val Pro Val Arg Cys
 1220 1225 1230
 25 Asp Val Thr Asp Arg Ala Ala Leu Ala Ala Leu Leu Asp Glu His Ala
 1235 1240 1245
 Pro Thr Val Ala Val His Ala Pro Pro Leu Val Pro Leu Ala Pro Leu
 1250 1255 1260
 30 Arg Glu Thr Ala Pro Gly Asp Ile Ala Ala Ala Leu Ala Ala Lys Thr
 1265 1270 1275 1280
 Thr Ala Ala Gly His Leu Val Asp Leu Ala Pro Ala Ala Gly Leu Asp
 1285 1290 1295
 35 Ala Leu Val Leu Phe Ser Ser Val Ser Gly Val Trp Gly Gly Ala Ala
 1300 1305 1310
 Gln Gly Gly Tyr Ala Ala Ala Ser Ala His Leu Asp Ala Leu Ala Glu
 1315 1320 1325
 40 Arg Ala Arg Ala Ala Gly Val Pro Ala Phe Ser Val Ala Trp Ser Pro
 1330 1335 1340
 45 Trp Ala Gly Gly Thr Pro Ala Asp Gly Ala Glu Ala Glu Phe Leu Ser
 1345 1350 1355 1360
 Arg Arg Gly Leu Ala Pro Leu Asp Pro Asp Gln Ala Val Arg Thr Leu
 1365 1370 1375
 50 Arg Arg Met Leu Glu Arg Gly Ser Ala Cys Gly Ala Val Ala Asp Val
 1380 1385 1390
 Glu Trp Ser Arg Phe Ala Ala Ser Tyr Thr Trp Val Arg Pro Ala Val
 1395 1400 1405
 55 Leu Phe Asp Asp Ile Pro Asp Val Gln Arg Leu Arg Ala Ala Glu Leu
 1410 1415 1420

Ala Pro Ser Thr Gly Asp Ser Thr Thr Ser Glu Leu Val Arg Glu Leu
 1425 1430 1435 1440
 5 Thr Ala Gln Ser Gly His Lys Arg His Ala Thr Leu Leu Arg Leu Val
 1445 1450 1455
 Arg Ala His Ala Ala Ala Val Leu Gly Gln Ser Ser Gly Asp Ala Val
 1460 1465 1470
 10 Ser Ser Ala Arg Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Thr Ala
 1475 1480 1485
 Leu Glu Leu Arg Asp Arg Leu Ser Thr Ser Thr Gly Leu Lys Leu Pro
 1490 1495 1500
 15 Thr Ser Leu Val Phe Asp His Ser Ser Pro Ala Ala Leu Ala Arg His
 1505 1510 1515 1520
 Leu Gly Glu Glu Leu Leu Gly Arg Asn Asp Thr Ala Asp Arg Ala Gly
 1525 1530 1535
 20 Pro Asp Thr Pro Val Arg Thr Asp Glu Pro Ile Ala Ile Ile Gly Met
 1540 1545 1550
 Ala Cys Arg Leu Pro Gly Gly Val Gln Ser Pro Glu Asp Leu Trp Asp
 1555 1560 1565
 25 Leu Leu Thr Gly Gly Thr Asp Ala Ile Thr Pro Phe Pro Thr Asn Arg
 1570 1575 1580
 Gly Trp Asp Asn Glu Thr Leu Tyr Asp Pro Asp Pro Asp Ser Pro Gly
 1585 1590 1595 1600
 His His Thr Tyr Val Arg Glu Gly Gly Phe Leu His Asp Ala Ala Glu
 1605 1610 1615
 35 Phe Asp Pro Gly Phe Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met
 1620 1625 1630
 Asp Pro Gln Gln Arg Leu Ile Leu Glu Thr Ser Trp Glu Ser Phe Glu
 1635 1640 1645
 40 Arg Ala Gly Ile Asp Pro Val Glu Leu Arg Gly Ser Arg Thr Gly Val
 1650 1655 1660
 Phe Val Gly Thr Asn Gly Gln His Tyr Val Pro Leu Leu Gln Asp Gly
 1665 1670 1675 1680
 45 Asp Glu Asn Phe Asp Gly Tyr Ile Ala Thr Gly Asn Ser Ala Ser Val
 1685 1690 1695
 Met Ser Gly Arg Leu Ser Tyr Val Phe Gly Leu Glu Gly Pro Ala Val
 1700 1705 1710
 50 Thr Val Asp Thr Ala Cys Ser Ala Ser Leu Ala Ala Leu His Leu Ala
 1715 1720 1725
 Val Gln Ser Leu Arg Arg Gly Glu Cys Asp Tyr Ala Leu Ala Gly Gly
 1730 1735 1740
 55

Ala Thr Val Met Ser Thr Pro Glu Met Leu Val Glu Phe Ala Arg Gln
 1745 1750 1755 1760

5 Arg Ala Val Ser Pro Asp Gly Arg Ser Lys Ala Phe Ala Glu Ala Ala
 1765 1770 1775

Asp Gly Val Gly Leu Ala Glu Gly Ala Gly Met Leu Leu Val Glu Arg
 1780 1785 1790

10 Leu Ser Glu Ala Gln Lys Lys Gly His Pro Val Leu Ala Val Val Arg
 1795 1800 1805

Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro
 1810 1815 1820

15 Ser Gly Pro Ala Gln Gln Arg Val Ile Arg Glu Ala Leu Ala Asp Ala
 1825 1830 1835 1840

Gly Leu Thr Pro Ala Asp Val Asp Ala Val Glu Ala His Gly Thr Gly
 1845 1850 1855

20 Thr Pro Leu Gly Asp Pro Ile Glu Ala Gly Ala Leu Leu Ala Thr Tyr
 1860 1865 1870

Gly Arg Asp Arg Arg Asp Gly Pro Leu Trp Leu Gly Ser Leu Lys Ser
 1875 1880 1885

25 Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys
 1890 1895 1900

30 Met Val Leu Ala Leu Arg His Gly Glu Leu Pro Arg Thr Leu His Ala
 1905 1910 1915 1920

Ser Thr Ala Ser Ser Arg Ile Asp Trp Asp Ala Gly Ala Val Glu Leu
 1925 1930 1935

35 Leu Asp Glu Ala Arg Pro Trp Leu Gln Arg Ala Glu Gly Pro Arg Arg
 1940 1945 1950

Ala Gly Ile Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Leu Val
 1955 1960 1965

40 Ile Glu Glu Pro Pro Glu Pro Thr Ala Pro Glu Leu Leu Ala Pro Glu
 1970 1975 1980

Pro Ala Ala Asp Gly Asp Val Trp Ser Glu Glu Trp Trp His Glu Val
 1985 1990 1995 2000

45 Thr Val Pro Leu Met Met Ser Ala His Asn Glu Ala Ala Leu Arg Asp
 2005 2010 2015

50 Gln Ala Arg Arg Leu Arg Ala Asp Leu Leu Ala His Pro Glu Leu His
 2020 2025 2030

Pro Ala Asp Val Gly Tyr Thr Leu Ile Thr Thr Arg Thr Arg Phe Glu
 2035 2040 2045

55 Gln Arg Ala Ala Val Val Gly Glu Asn Phe Thr Glu Leu Ile Ala Ala
 2050 2055 2060

Leu Asp Asp Leu Val Glu Gly Arg Pro His Pro Leu Val Leu Arg Gly
 2065 2070 2075 2080
 5 Thr Ala Gly Thr Ser Asp Gln Val Val Phe Val Phe Pro Gly Gln Gly
 2085 2090 2095
 Ser Gln Trp Pro Glu Met Ala Asp Gly Leu Leu Ala Arg Ser Ser Gly
 2100 2105 2110
 10 Ser Gly Ser Phe Leu Glu Thr Ala Arg Ala Cys Asp Leu Ala Leu Arg
 2115 2120 2125
 Pro His Leu Gly Trp Ser Val Leu Asp Val Leu Arg Arg Glu Pro Gly
 2130 2135 2140
 15 Ala Pro Ser Leu Asp Arg Val Asp Val Val Gln Pro Val Leu Phe Thr
 2145 2150 2155 2160
 Met Met Val Ser Leu Ala Glu Thr Trp Arg Ser Leu Gly Val Glu Pro
 2165 2170 2175
 20 Ala Ala Val Val Gly His Ser Gln Gly Glu Ile Ala Ala Ala Tyr Val
 2180 2185 2190
 Ala Gly Ala Leu Thr Leu Asp Asp Ala Ala Arg Ile Val Ala Leu Arg
 2195 2200 2205
 25 Ser Gln Ala Trp Leu Arg Leu Ala Gly Lys Gly Gly Met Val Ala Val
 2210 2215 2220
 Thr Leu Ser Glu Arg Asp Leu Arg Pro Arg Leu Glu Pro Trp Ser Asp
 2225 2230 2235 2240
 30 Arg Leu Ala Val Ala Ala Val Asn Gly Pro Glu Thr Cys Ala Val Ser
 2245 2250 2255
 Gly Asp Pro Asp Ala Leu Ala Glu Leu Val Ala Glu Leu Gly Ala Glu
 2260 2265 2270
 35 Gly Val His Ala Arg Pro Ile Pro Gly Val Asp Thr Ala Gly His Ser
 2275 2280 2285
 40 Pro Gln Val Asp Thr Leu Glu Ala His Leu Arg Lys Val Leu Ala Pro
 2290 2295 2300
 Val Ala Pro Arg Thr Ser Asp Ile Pro Phe Tyr Ser Thr Val Thr Gly
 2305 2310 2315 2320
 45 Gly Leu Ile Asp Thr Ala Glu Leu Asp Ala Asp Tyr Trp Tyr Arg Asn
 2325 2330 2335
 Met Arg Glu Pro Val Glu Phe Glu Gln Ala Thr Arg Ala Leu Ile Ala
 2340 2345 2350
 50 Asp Gly His Asp Val Phe Leu Glu Ser Ser Pro His Pro Met Leu Ala
 2355 2360 2365
 Val Ser Leu Gln Glu Thr Ile Ser Asp Ala Gly Ser Pro Ala Ala Val
 2370 2375 2380
 55

Leu Gly Thr Leu Arg Arg Gly Gln Gly Gly Pro Arg Trp Leu Gly Val
 2385 2390 2395 2400
 5 Ala Leu Cys Arg Ala Tyr Thr His Gly Leu Glu Ile Asp Ala Glu Ala
 2405 2410 2415
 Ile Phe Gly Pro Asp Ser Arg Gln Val Glu Leu Pro Thr Tyr Pro Phe
 2420 2425 2430
 10 Gln Arg Glu Arg Tyr Trp Tyr Ser Pro Gly His Arg Gly Asp Asp Pro
 2435 2440 2445
 Ala Ser Leu Gly Leu Asp Ala Val Asp His Pro Leu Leu Gly Ser Gly
 2450 2455 2460
 15 Val Glu Leu Pro Glu Ser Gly Asp Arg Met Tyr Thr Ala Arg Leu Gly
 2465 2470 2475 2480
 Ala Asp Thr Thr Pro Trp Leu Ala Asp His Ala Leu Leu Gly Ser Pro
 2485 2490 2495
 20 Leu Leu Pro Gly Ala Ala Phe Ala Asp Leu Ala Leu Trp Ala Gly Arg
 2500 2505 2510
 25 Gln Ala Gly Thr Gly Arg Val Glu Glu Leu Thr Leu Ala Ala Pro Leu
 2515 2520 2525
 Val Leu Pro Gly Ser Gly Gly Val Arg Leu Arg Leu Asn Val Gly Ala
 2530 2535 2540
 30 Pro Gly Thr Asp Asp Ala Arg Arg Phe Ala Val His Ala Arg Ala Glu
 2545 2550 2555 2560
 Gly Ala Thr Asp Trp Thr Leu His Ala Glu Gly Leu Leu Thr Ala Gln
 2565 2570 2575
 35 Asp Thr Ala Asp Ala Pro Asp Ala Ser Ala Ala Thr Pro Pro Pro Gly
 2580 2585 2590
 Ala Glu Gln Leu Asp Ile Gly Asp Phe Tyr Gln Arg Phe Ser Glu Leu
 2595 2600 2605
 40 Gly Tyr Gly Tyr Gly Pro Phe Phe Arg Gly Leu Val Ser Ala His Arg
 2610 2615 2620
 Cys Gly Pro Asp Ile His Ala Glu Val Ala Leu Pro Val Gln Ala Gln
 2625 2630 2635 2640
 45 Gly Asp Ala Ala Arg Phe Gly Ile His Pro Ala Leu Leu Asp Ala Ala
 2645 2650 2655
 Leu Gln Thr Met Ser Leu Gly Gly Phe Phe Pro Glu Asp Gly Arg Val
 2660 2665 2670
 50 Arg Met Pro Phe Ala Leu Arg Gly Val Arg Leu Tyr Arg Ala Gly Ala
 2675 2680 2685
 55 Asp Arg Leu His Val Arg Val Ser Pro Val Ser Glu Asp Ala Val Arg
 2690 2695 2700

Ile Arg Cys Ala Asp Gly Glu Gly Arg Pro Val Ala Glu Ile Glu Ser
 2705 2710 2715 2720
 5 Phe Ile Met Arg Pro Val Asp Pro Gly Gln Leu Leu Gly Gly Arg Pro
 2725 2730 2735
 Val Gly Ala Asp Ala Leu Phe Arg Ile Ala Trp Arg Glu Leu Ala Ala
 2740 2745 2750
 10 Gly Pro Gly Thr Arg Thr Gly Asp Gly Thr Pro Pro Pro Val Arg Trp
 2755 2760 2765
 Val Leu Ala Gly Pro Asp Ala Leu Gly Leu Ala Glu Ala Ala Asp Ala
 2770 2775 2780
 15 His Leu Pro Ala Val Pro Gly Pro Asp Gly Ala Leu Pro Ser Pro Thr
 2785 2790 2795 2800
 Gly Arg Pro Ala Pro Asp Ala Val Val Phe Ala Val Arg Ala Gly Thr
 2805 2810 2815
 20 Gly Asp Val Ala Ala Asp Ala His Thr Val Ala Cys Arg Val Leu Asp
 2820 2825 2830
 Leu Val Gln Arg Arg Leu Ala Ala Pro Glu Gly Pro Asp Gly Ala Arg
 2835 2840 2845
 Leu Val Val Ala Thr Arg Gly Ala Val Ala Val Arg Asp Asp Ala Glu
 2850 2855 2860
 30 Val Asp Asp Pro Ala Ala Ala Ala Trp Gly Leu Leu Arg Ser Ala
 2865 2870 2875 2880
 Gln Ala Glu Glu Pro Gly Arg Phe Leu Leu Val Asp Leu Asp Asp Asp
 2885 2890 2895
 35 Pro Ala Ser Ala Arg Ala Leu Thr Asp Ala Leu Ala Ser Gly Glu Pro
 2900 2905 2910
 Gln Thr Ala Val Arg Ala Gly Thr Val Tyr Val Pro Arg Leu Glu Arg
 2915 2920 2925
 40 Ala Ala Asp Arg Thr Asp Gly Pro Leu Thr Pro Pro Asp Asp Gly Ala
 2930 2935 2940
 Trp Arg Leu Gly Arg Gly Thr Asp Leu Thr Leu Asp Gly Leu Ala Leu
 2945 2950 2955 2960
 45 Val Pro Ala Pro Asp Ala Glu Ala Pro Leu Glu Pro Gly Gln Val Arg
 2965 2970 2975
 Val Ala Val Arg Ala Ala Gly Val Asn Phe Arg Asp Ala Leu Ile Ala
 2980 2985 2990
 50 Leu Gly Met Tyr Pro Gly Glu Ala Glu Met Gly Thr Glu Gly Ala Gly
 2995 3000 3005
 Thr Val Val Glu Val Gly Pro Gly Val Thr Gly Val Ala Val Gly Asp
 3010 3015 3020
 55

Arg Val Leu Gly Leu Trp Asp Gly Gly Leu Gly Pro Leu Cys Val Ala
 3025 3030 3035 3040
 5 Asp His Arg Leu Leu Ala Pro Val Pro Asp Gly Trp Ser Tyr Ala Gln
 3045 3050 3055
 Ala Ala Ser Val Pro Ala Val Phe Leu Ser Ala Tyr Tyr Gly Leu Val
 3060 3065 3070
 10 Thr Leu Ala Gly Leu Arg Pro Gly Glu Arg Val Leu Val His Ala Ala
 3075 3080 3085
 Ala Gly Gly Val Gly Met Ala Ala Val Gln Ile Ala Arg His Leu Gly
 3090 3095 3100
 15 Ala Glu Val Leu Ala Thr Ala Ser Pro Gly Lys Trp Asp Ala Leu Arg
 3105 3110 3115 3120
 Ala Met Gly Ile Thr Asp Asp His Leu Ala Ser Ser Arg Thr Leu Asp
 20 3125 3130 3135
 Phe Ala Thr Ala Phe Thr Gly Ala Asp Gly Thr Ser Arg Ala Asp Val
 3140 3145 3150
 25 Val Leu Asn Ser Leu Thr Lys Glu Phe Val Asp Ala Ser Leu Gly Leu
 3155 3160 3165
 Leu Arg Pro Gly Gly Arg Phe Leu Glu Leu Gly Lys Thr Asp Val Arg
 3170 3175 3180
 30 Asp Pro Glu Arg Ile Ala Ala Glu His Pro Gly Val Arg Tyr Arg Ala
 3185 3190 3195 3200
 Phe Asp Leu Asn Glu Ala Gly Pro Asp Ala Leu Gly Arg Leu Leu Arg
 3205 3210 3215
 35 Glu Leu Met Asp Leu Phe Ala Ala Gly Val Leu His Pro Leu Pro Val
 3220 3225 3230
 Val Thr His Asp Val Arg Arg Ala Ala Asp Ala Leu Arg Thr Ile Ser
 40 3235 3240 3245
 Gln Ala Arg His Thr Gly Lys Leu Val Leu Thr Met Pro Pro Ala Trp
 3250 3255 3260
 45 His Pro Tyr Gly Thr Val Leu Val Thr Gly Gly Thr Gly Ala Leu Gly
 3265 3270 3275 3280
 Ser Arg Ile Ala Arg His Leu Ala Ser Arg His Gly Val Arg Arg Leu
 3285 3290 3295
 50 Leu Ile Ala Ala Arg Arg Gly Pro Asp Gly Glu Gly Ala Ala Glu Leu
 3300 3305 3310
 Val Ala Asp Leu Ala Ala Leu Gly Ala Ser Ala Thr Val Val Ala Cys
 3315 3320 3325
 55 Asp Val Ser Asp Ala Asp Ala Val Arg Gly Leu Leu Ala Gly Ile Pro
 3330 3335 3340

Ala Asp His Pro Leu Thr Ala Val Val His Ser Thr Gly Val Leu Asp
 3345 3350 3355 3360
 5 Asp Gly Val Leu Pro Gly Leu Thr Pro Glu Arg Met Arg Arg Val Leu
 3365 3370 3375
 Arg Pro Lys Val Glu Ala Ala Val His Leu Asp Glu Leu Thr Arg Asp
 3380 3385 3390
 10 Leu Asp Leu Ser Ala Phe Val Leu Phe Ser Ser Ser Ala Gly Leu Leu
 3395 3400 3405
 Gly Ser Pro Ala Gln Gly Asn Tyr Ala Ala Ala Asn Ala Thr Leu Asp
 3410 3415 3420
 15 Ala Leu Ala Ala Arg Arg Arg Ser Leu Gly Leu Pro Ser Val Ser Leu
 3425 3430 3435 3440
 Ala Trp Gly Leu Trp Ser Asp Thr Ser Arg Met Ala His Ala Leu Asp
 3445 3450 3455
 20 Gln Glu Ser Leu Gln Arg Arg Phe Ala Arg Ser Gly Phe Pro Pro Leu
 3460 3465 3470
 25 Ser Ala Thr Leu Gly Ala Ala Leu Phe Asp Ala Ala Leu Arg Val Asp
 3475 3480 3485
 Glu Ala Val Gln Val Pro Met Arg Phe Asp Pro Ala Ala Leu Arg Ala
 3490 3495 3500
 30 Thr Gly Ser Val Pro Ala Leu Leu Ser Asp Leu Val Gly Ser Ala Pro
 3505 3510 3515 3520
 Ala Thr Gly Ser Ala Ala Pro Ala Ser Gly Pro Leu Pro Ala Pro Asp
 3525 3530 3535
 35 Ala Gly Thr Val Gly Glu Pro Leu Ala Glu Arg Leu Ala Gly Leu Ser
 3540 3545 3550
 Ala Glu Glu Arg His Asp Arg Leu Leu Gly Leu Val Gly Glu His Val
 3555 3560 3565
 40 Ala Ala Val Leu Gly His Gly Ser Ala Ala Glu Val Arg Pro Asp Arg
 3570 3575 3580
 Pro Phe Arg Glu Val Gly Phe Asp Ser Leu Thr Ala Val Glu Leu Arg
 3585 3590 3595 3600
 45 Asn Arg Met Ala Ala Val Thr Gly Val Arg Leu Pro Ala Thr Leu Val
 3605 3610 3615
 50 Phe Asp His Pro Thr Pro Ala Ala Leu Ser Ser His Leu Asp Gly Leu
 3620 3625 3630
 Leu Ala Pro Ala Gln Pro Val Thr Thr Thr Pro Leu Leu Ser Glu Leu
 3635 3640 3645
 55 Asp Arg Ile Glu Glu Ala Leu Ala Ala Leu Thr Pro Glu His Leu Ala
 3650 3655 3660

Glu Leu Ala Pro Ala Pro Asp Asp Arg Ala Glu Val Ala Leu Arg Leu
3665 3670 3675 3680

5 Asp Ala Leu Ala Asp Arg Trp Arg Ala Leu His Asp Gly Ala Pro Gly
3685 3690 3695

Ala Asp Asp Asp Ile Thr Asp Val Leu Ser Ser Ala Asp Asp Asp Glu
3700 3705 3710

10 Ile Phe Ala Phe Ile Asp Glu Arg Tyr Gly Thr Ser
3715 3720

15 (2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 1580 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: unknown

20 (ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

25 Met Ala Asn Glu Glu Lys Leu Arg Ala Tyr Leu Lys Arg Val Thr Gly
1 5 10 15

Glu Leu His Arg Ala Thr Glu Gln Leu Arg Ala Leu Asp Arg Arg Ala
20 25 30

30 His Glu Pro Ile Ala Ile Val Gly Ala Ala Cys Arg Leu Pro Gly Gly
35 40 45

Val Glu Ser Pro Asp Asp Leu Trp Glu Leu Leu His Ala Gly Ala Asp
50 55 60

Ala Val Gly Pro Ala Pro Ala Asp Arg Gly Trp Asp Val Glu Gly Arg
65 70 75 80

40 Tyr Ser Pro Asp Pro Asp Thr Pro Gly Thr Ser Tyr Cys Arg Glu Gly
85 90 95

Gly Phe Val Gln Gly Ala Asp Arg Phe Asp Pro Ala Leu Phe Gly Ile
100 105 110

45 Ser Pro Asn Glu Ala Leu Thr Met Asp Pro Gln Gln Arg Leu Leu Leu
115 120 125

Glu Thr Ser Trp Glu Ala Leu Glu Arg Ala Gly Leu Asp Pro Gln Ser
130 135 140

50 Leu Ala Gly Ser Arg Thr Gly Val Phe Ala Gly Ala Trp Glu Ser Gly
145 150 155 160

Tyr Gln Lys Gly Val Glu Gly Leu Glu Ala Asp Leu Glu Ala Gln Leu
165 170 175

55 Leu Ala Gly Ile Val Ser Phe Thr Ala Gly Arg Val Ala Tyr Ala Leu

EP 0 791 656 A2

	180	185	190
5	Gly Leu Glu Gly Pro Ala Leu Thr 195	Ile Asp Thr Ala Cys Ser Ser Ser 200	
	Leu Val Ala Leu His Leu Ala Val Gln Ser Leu Arg Arg Gly Glu Cys 210		220
10	Asp Leu Ala Leu Ala Gly Gly Ala Thr Val Ile Ala Asp Phe Ala Leu 225		235 240
	Phe Thr Gln Phe Ser Arg Gln Arg Gly Leu Ala Pro Asp Gly Arg Cys 245		250 255
15	Lys Ala Phe Gly Glu Thr Ala Asp Gly Phe Gly Pro Ala Glu Gly Ala 260		265 270
	Gly Met Leu Leu Val Glu Arg Leu Ser Asp Ala Arg Arg Asn Gly His 275		280 285
20	Pro Val Leu Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp Gly Ala 290		295 300
	Ser Asn Gly Leu Thr Ala Pro Ser Gly Pro Ala Gln Gln Arg Val Ile 305		310 315 320
25	Arg Glu Ala Leu Ala Asp Ala Gly Leu Thr Pro Ala Asp Val Asp Ala 325		330 335
	Val Glu Ala His Gly Thr Gly Thr Pro Leu Gly Asp Pro Ile Glu Ala 340		345 350
30	Gly Ala Leu Met Ala Thr Tyr Gly His Glu Arg Thr Gly Asp Pro Leu 355		360 365
	Trp Leu Gly Ser Leu Lys Ser Asn Ile Gly His Thr Gln Ala Ala Ala 370		375 380
35	Gly Val Ala Gly Val Ile Lys Met Val Leu Ala Leu Arg His Gly Glu 385		390 395 400
	Leu Pro Arg Thr Leu His Ala Ser Thr Ala Ser Ser Arg Ile Glu Trp 405		410 415
40	Asp Ala Gly Ala Val Glu Leu Leu Asp Glu Ala Arg Pro Trp Pro Arg 420		425 430
45	Arg Ala Glu Gly Pro Arg Arg Ala Gly Ile Ser Ser Phe Gly Ile Ser 435		440 445
	Gly Thr Asn Ala His Leu Val Ile Glu Glu Glu Pro Pro Ala Arg Pro 450		455 460
50	Glu Pro Glu Glu Ala Ala Gln Pro Pro Ala Pro Ala Thr Thr Val Leu 465		470 475 480
	Pro Leu Ser Ala Ala Gly Ala Arg Ser Leu Arg Glu Gln Ala Arg Arg 485		490 495
55			

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	Leu	Ala	Ala	His	Leu	Ala	Gly	His	Glu	Glu	Ile	Thr	Ala	Ala	Asp	Ala	
				500					505						510		
5	Ala	Arg	Ser	Ala	Ala	Thr	Thr	Arg	Ala	Ala	Leu	Ser	His	Arg	Ala	Ser	
			515					520					525				
	Val	Leu	Ala	Asp	Asp	Arg	Arg	Ala	Leu	Ile	Asp	Arg	Leu	Thr	Ala	Leu	
		530					535					540					
10	Ala	Glu	Asp	Arg	Lys	Asp	Pro	Gly	Val	Thr	Val	Gly	Glu	Ala	Gly	Ser	
	545					550					555					560	
	Gly	Arg	Pro	Pro	Val	Phe	Val	Phe	Pro	Gly	Gln	Gly	Ser	Gln	Trp	Thr	
					565					570					575		
15	Gly	Met	Gly	Ala	Glu	Leu	Leu	Asp	Arg	Ala	Pro	Val	Phe	Arg	Ala	Lys	
				580					585					590			
	Ala	Glu	Glu	Cys	Ala	Arg	Ala	Leu	Ala	Ala	His	Leu	Asp	Trp	Ser	Val	
			595					600					605				
20	Leu	Asp	Val	Leu	Arg	Asp	Ala	Pro	Gly	Ala	Pro	Pro	Ile	Asp	Arg	Ala	
		610					615					620					
	Asp	Val	Val	Gln	Pro	Thr	Leu	Phe	Thr	Met	Met	Val	Ser	Leu	Ala	Ala	
	625					630					635				640		
25	Leu	Trp	Glu	Ser	His	Gly	Val	Arg	Pro	Ala	Ala	Val	Val	Gly	His	Ser	
					645					650					655		
	Gln	Gly	Glu	Ile	Ala	Ala	Ala	His	Ala	Ala	Gly	Ala	Leu	Ser	Leu	Asp	
30				660					665					670			
	Asp	Ala	Ala	Arg	Val	Ile	Ala	Glu	Arg	Ser	Arg	Leu	Trp	Lys	Arg	Leu	
			675					680					685				
35	Ala	Gly	Asn	Gly	Gly	Met	Leu	Ser	Val	Met	Ala	Pro	Ala	Asp	Arg	Val	
		690					695					700					
	Arg	Glu	Leu	Met	Glu	Pro	Trp	Ala	Glu	Arg	Met	Ser	Val	Ala	Ala	Val	
	705					710					715					720	
40	Asn	Gly	Pro	Ala	Ser	Val	Thr	Val	Ala	Gly	Asp	Ala	Arg	Ala	Leu	Glu	
					725					730					735		
	Glu	Phe	Gly	Gly	Arg	Leu	Ser	Ala	Ala	Gly	Val	Leu	Arg	Trp	Pro	Leu	
				740					745					750			
45	Ala	Gly	Val	Asp	Phe	Ala	Gly	His	Ser	Pro	Gln	Val	Glu	Gln	Phe	Arg	
			755					760					765				
	Ala	Glu	Leu	Leu	Asp	Thr	Leu	Gly	Thr	Val	Arg	Pro	Thr	Ala	Ala	Arg	
50			770				775					780					
	Leu	Pro	Phe	Phe	Ser	Thr	Val	Thr	Ala	Ala	Ala	His	Glu	Pro	Glu	Gly	
	785					790					795					800	
55	Leu	Asp	Ala	Ala	Tyr	Trp	Tyr	Arg	Asn	Met	Arg	Glu	Pro	Val	Glu	Phe	
				805						810					815		

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	Ala Ser Thr Leu Arg Thr Leu Leu Arg Glu Gly His Arg Thr Phe Val	820	825	830
5	Glu Met Gly Pro His Pro Leu Leu Gly Ala Ala Ile Asp Glu Val Ala	835	840	845
	Glu Ala Glu Gly Val His Ala Thr Ala Leu Ala Thr Leu His Arg Gly	850	855	860
10	Ser Gly Gly Leu Asp Arg Phe Arg Ser Ser Val Gly Ala Ala Phe Ala	865	870	875
	His Gly Val Arg Val Asp Trp Asp Ala Leu Phe Glu Gly Ser Gly Ala	885	890	895
15	Arg Arg Val Pro Leu Pro Thr Tyr Ala Phe Ser Arg Asp Arg Tyr Trp	900	905	910
	Leu Pro Thr Ala Ile Gly Arg Arg Ala Val Glu Ala Ala Pro Val Asp	915	920	925
20	Ala Ser Ala Pro Gly Arg Tyr Arg Val Thr Trp Thr Pro Val Ala Ser	930	935	940
	Asp Asp Ser Gly Arg Pro Ser Gly Arg Trp Leu Leu Val Gln Thr Pro	945	950	955
25	Gly Thr Ala Pro Asp Glu Ala Asp Thr Ala Ala Ser Ala Leu Gly Ala	965	970	975
	Ala Gly Val Val Val Glu Arg Cys Leu Leu Asp Pro Thr Glu Ala Ala	980	985	990
30	Arg Val Thr Leu Thr Glu Arg Leu Ala Glu Leu Asp Ala Gln Pro Glu	995	1000	1005
	Gly Leu Ala Gly Val Leu Val Leu Pro Gly Arg Pro Gln Ser Thr Ala	1010	1015	1020
35	Pro Ala Asp Ala Ser Pro Leu Asp Pro Gly Thr Ala Ala Val Leu Leu	1025	1030	1035
	Val Val Gln Ala Val Pro Asp Ala Ala Pro Lys Ala Arg Ile Trp Val	1045	1050	1055
40	Val Thr Arg Gly Ala Val Ala Val Gly Ser Gly Glu Val Pro Cys Ala	1060	1065	1070
45	Val Gly Ala Arg Val Trp Gly Leu Gly Arg Val Ala Ala Leu Glu Val	1075	1080	1085
	Pro Val Gln Trp Gly Gly Leu Val Asp Val Ala Val Gly Ala Gly Val	1090	1095	1100
50	Arg Glu Trp Arg Arg Val Val Gly Val Val Ala Gly Gly Gly Glu Asp	1105	1110	1115
	Gln Val Ala Val Arg Gly Gly Gly Val Phe Gly Arg Arg Leu Val Gly	1125	1130	1135
55				

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Val Gly Val Arg Gly Gly Ser Gly Val Trp Arg Ala Arg Gly Cys Val
1140 1145 1150

5 Val Val Thr Gly Gly Leu Gly Gly Val Gly Gly His Val Ala Arg Trp
1155 1160 1165

Leu Ala Arg Ser Gly Ala Glu His Val Val Leu Ala Gly Arg Arg Gly
1170 1175 1180

10 Gly Gly Val Val Gly Ala Val Glu Leu Glu Arg Glu Leu Val Gly Leu
1185 1190 1195 1200

Gly Ala Lys Val Thr Phe Val Ser Cys Asp Val Gly Asp Arg Ala Ser
1205 1210 1215

15 Met Val Gly Leu Leu Gly Val Val Glu Gly Leu Gly Val Pro Leu Arg
1220 1225 1230

Gly Val Phe His Ala Ala Gly Val Ala Gln Val Ser Gly Leu Gly Glu
1235 1240 1245

20 Val Ser Leu Ala Glu Ala Gly Gly Val Leu Gly Gly Lys Ala Val Gly
1250 1255 1260

Ala Glu Leu Leu Asp Glu Leu Thr Ala Gly Val Glu Leu Asp Ala Phe
1265 1270 1275 1280

25 Val Leu Phe Ser Ser Gly Ala Gly Val Trp Gly Ser Gly Gly Gln Ser
1285 1290 1295

Val Tyr Ala Ala Ala Asn Ala His Leu Asp Ala Leu Ala Glu Arg Arg
1300 1305 1310

30 Arg Ala Gln Gly Arg Pro Ala Thr Ser Val Ala Trp Gly Leu Trp Gly
1315 1320 1325

Gly Glu Gly Met Gly Ala Asp Glu Gly Val Thr Glu Phe Tyr Ala Glu
1330 1335 1340

35 Arg Gly Leu Ala Pro Met Arg Pro Glu Ser Gly Ile Glu Ala Leu His
1345 1350 1355 1360

40 Thr Ala Leu Asn Glu Gly Asp Thr Cys Val Thr Val Ala Asp Ile Asp
1365 1370 1375

Trp Glu His Phe Val Thr Gly Phe Thr Ala Tyr Arg Pro Ser Pro Leu
1380 1385 1390

45 Ile Ser Asp Ile Pro Gln Val Arg Ala Leu Arg Thr Pro Glu Pro Thr
1395 1400 1405

Val Asp Ala Ser Asp Gly Leu Arg Arg Arg Val Asp Ala Ala Leu Thr
1410 1415 1420

50 Pro Arg Glu Arg Thr Lys Val Leu Val Asp Leu Val Arg Thr Val Ala
1425 1430 1435 1440

Ala Glu Val Leu Gly His Asp Gly Ile Gly Gly Ile Gly His Asp Val
1445 1450 1455

55

Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Ala Ala Val Arg Met Arg
 1460 1465 1470

5 Gly Arg Leu Ala Glu Ala Thr Gly Leu Val Leu Pro Ala Thr Val Ile
 1475 1480 1485

Phe Asp His Pro Thr Val Asp Arg Leu Gly Gly Ala Leu Leu Glu Arg
 1490 1495 1500

10 Leu Ser Ala Asp Glu Pro Ala Pro Gly Gly Ala Pro Glu Pro Ala Gly
 1505 1510 1515 1520

Gly Arg Pro Ala Thr Pro Pro Pro Ala Pro Glu Pro Ala Val His Asp
 1525 1530 1535

15 Ala Asp Ile Asp Glu Leu Asp Ala Asp Ala Leu Ile Arg Leu Ala Thr
 1540 1545 1550

Gly Thr Ala Gly Pro Ala Asp Gly Thr Pro Ala Asp Gly Gly Pro Asp
 1555 1560 1565

20 Ala Ala Ala Thr Ala Pro Asp Gly Ala Pro Glu Gln
 1570 1575 1580

25 (2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 1891 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

35 Met Ser Pro Ser Met Asp Glu Val Leu Gly Ala Leu Arg Thr Ser Val
 1 5 10 15

40 Lys Glu Thr Glu Arg Leu Arg Arg His Asn Arg Glu Leu Leu Ala Gly
 20 25 30

Ala His Glu Pro Val Ala Ile Val Gly Met Ala Cys Arg Tyr Pro Gly
 35 40 45

45 Gly Val Ser Thr Pro Asp Asp Leu Trp Glu Leu Ala Ala Asp Gly Val
 50 55 60

Asp Ala Ile Thr Pro Phe Pro Ala Asp Arg Gly Trp Asp Glu Asp Ala
 65 70 75 80

50 Val Tyr Ser Pro Asp Pro Asp Thr Pro Gly Thr Thr Tyr Cys Arg Glu
 85 90 95

Gly Gly Phe Leu Thr Gly Ala Gly Asp Phe Asp Ala Ala Phe Phe Gly
 100 105 110

55 Ile Ser Pro Asn Glu Ala Leu Val Met Asp Pro Gln Gln Arg Leu Leu

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	115	120	125
5	Leu Glu Thr Ser Trp Glu Thr 130	Leu Glu Arg Ala Gly 135	Ile Val Pro Ala 140
	Ser Leu Arg Gly Ser Arg Thr 145	Gly Val Phe Val 150	Gly Ala Ala His Thr 155 160
10	Gly Tyr Val Thr Asp Thr Ala Arg Ala Pro Glu Gly Thr Glu Gly Tyr 165		170 175
	Leu Leu Thr Gly Asn Ala Asp Ala Val Met Ser Gly Arg Ile Ala Tyr 180		185 190
15	Ser Leu Gly Leu Glu Gly Pro Ala Leu Thr Ile Gly Thr Ala Cys Ser 195		200 205
	Ser Ser Leu Val Ala Leu His Leu Ala Val Gln Ser Leu Arg Arg Gly 210		215 220
20	Glu Cys Asp Leu Ala Leu Ala Gly Gly Val Ala Val Met Pro Asp Pro 225		230 235 240
	Thr Val Phe Val Glu Phe Ser Arg Gln Arg Gly Leu Ala Val Asp Gly 245		250 255
25	Arg Cys Lys Ala Phe Ala Glu Gly Ala Asp Gly Thr Ala Trp Ala Glu 260		265 270
	Gly Val Gly Val Leu Leu Val Glu Arg Leu Ser Asp Ala Arg Arg Asn 275		280 285
30	Gly His Arg Val Leu Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp 290		295 300
	Gly Ala Ser Asn Gly Leu Thr Ala Pro Ser Gly Pro Ala Gln Gln Arg 305		310 315 320
35	Val Ile Arg Glu Ala Leu Ala Asp Ala Gly Leu Thr Pro Ala Asp Val 325		330 335
	Asp Val Val Glu Ala His Gly Thr Gly Thr Ala Leu Gly Asp Pro Ile 340		345 350
40	Glu Ala Gly Ala Leu Leu Ala Thr Tyr Gly Arg Glu Arg Val Gly Asp 355		360 365
	Pro Leu Trp Leu Gly Ser Leu Lys Ser Asn Ile Gly His Ala Gln Ala 370		375 380
45	Ala Ala Gly Val Gly Gly Val Ile Lys Val Val Gln Ala Met Arg His 385		390 395 400
	Gly Ser Leu Pro Arg Thr Leu His Val Asp Ala Pro Ser Ser Lys Val 405		410 415
50	Glu Trp Ala Ser Gly Ala Val Glu Leu Leu Thr Glu Gly Arg Ser Trp 420		425 430
55	Pro Arg Arg Val Glu Arg Val Arg Arg Ala Ala Val Ser Ala Phe Gly		

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	435	440	445
5	Val Ser Gly Thr Asn Ala His 450	Val Val Leu Glu Glu Ala 455	Pro Val Glu 460
	Ala Gly Ser Glu His Gly Asp Gly Pro Gly Pro Asp Arg Pro Asp Ala 465	470	475 480
10	Val Thr Gly Pro Leu Pro Trp Val Leu Ser Ala Arg Ser Arg Glu Ala 485	490	495
	Leu Arg Gly Gln Ala Gly Arg Leu Ala Ala Leu Ala Arg Gln Gly Arg 500	505	510
15	Thr Glu Gly Thr Gly Gly Gly Ser Gly Leu Val Val Pro Ala Ala Asp 515	520	525
	Ile Gly Tyr Ser Leu Ala Thr Thr Arg Glu Thr Leu Glu His Arg Ala 530	535	540
20	Val Ala Leu Val Gln Glu Asn Arg Thr Ala Gly Glu Asp Leu Ala Ala 545	550	555 560
	Leu Ala Ala Gly Arg Thr Pro Glu Ser Val Val Thr Gly Val Ala Arg 565	570	575
25	Arg Gly Arg Gly Ile Ala Phe Leu Cys Ser Gly Gln Gly Ala Gln Arg 580	585	590
	Leu Gly Ala Gly Arg Glu Leu Arg Gly Arg Phe Pro Val Phe Ala Asp 595	600	605
30	Ala Leu Asp Glu Ile Ala Ala Glu Phe Asp Ala His Leu Glu Arg Pro 610	615	620
	Leu Leu Ser Val Met Phe Ala Glu Pro Ala Thr Pro Asp Ala Ala Leu 625	630	635 640
35	Leu Asp Arg Thr Asp Tyr Thr Gln Pro Ala Leu Phe Ala Val Glu Thr 645	650	655
	Ala Leu Phe Arg Leu Leu Glu Ser Trp Gly Leu Val Pro Asp Val Leu 660	665	670
40	Val Gly His Ser Ile Gly Gly Leu Val Ala Ala His Val Ala Gly Val 675	680	685
	Phe Ser Ala Ala Asp Ala Ala Arg Leu Val Ser Ala Arg Gly Arg Leu 690	695	700
45	Met Arg Ala Leu Pro Glu Gly Gly Ala Met Ala Ala Val Gln Ala Thr 705	710	715 720
	Glu Arg Glu Ala Ala Ala Leu Glu Pro Val Ala Ala Gly Gly Ala Val 725	730	735
50	Val Ala Ala Val Asn Gly Pro Gln Ala Leu Val Leu Ser Gly Asp Glu 740	745	750
55	Ala Ala Val Leu Ala Ala Ala Gly Glu Leu Ala Ala Arg Gly Arg Arg		

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	755	760	765
5	Thr Lys Arg Leu Arg Val 770	Ser His Ala Phe His 775	Ser Pro Arg Met Asp 780
	Ala Met Leu Ala Asp Phe Arg Ala Val Ala Asp Thr Val Asp Tyr His 785	790	795 800
10	Ala Pro Arg Leu Pro Val Val Ser Glu Val Thr Gly Asp Leu Ala Asp 805	810	815
	Ala Ala Gln Leu Thr Asp Pro Gly Tyr Trp Thr Arg Gln Val Arg Gln 820	825	830
15	Pro Val Arg Phe Ala Asp Ala Val Arg Thr Ala Ser Ala Arg Asp Ala 835	840	845
	Ala Thr Phe Ile Glu Leu Gly Pro Asp Ala Val Leu Cys Gly Met Ala 850	855	860
20	Glu Glu Ser Leu Ala Ala Glu Ala Asp Val Val Phe Ala Pro Ala Leu 865	870	875 880
	Arg Arg Gly Arg Pro Glu Gly Asp Thr Val Leu Arg Ala Ala Ala Ser 885	890	895
25	Ala Tyr Val Arg Gly Ala Gly Leu Asp Trp Ala Ala Leu Tyr Gly Gly 900	905	910
	Thr Gly Ala Arg Arg Thr Asp Leu Pro Thr Tyr Ala Phe Gln His Ser 915	920	925
30	Arg Tyr Trp Leu Ala Pro Ala Ser Ala Ala Val Ala Pro Ala Thr Ala 930	935	940
	Ala Pro Ser Val Arg Ser Val Pro Glu Ala Glu Gln Asp Gly Ala Leu 945	950	955 960
35	Trp Ala Ala Val His Ala Gly Asp Val Ala Ser Ala Ala Ala Arg Leu 965	970	975
	Gly Ala Asp Asp Ala Gly Ile Glu His Glu Leu Arg Ala Val Leu Pro 980	985	990
40	His Leu Ala Ala Trp His Asp Arg Asp Arg Ala Thr Ala Arg Thr Ala 995	1000	1005
	Gly Leu His Tyr Arg Val Thr Trp Gln Ala Ile Glu Ala Asp Ala Val 1010	1015	1020
45	Arg Phe Ser Pro Ser Asp Arg Trp Leu Met Val Glu His Gly Gln His 1025	1030	1035 1040
	Thr Glu Cys Ala Asp Ala Ala Glu Arg Ala Leu Arg Ala Ala Gly Ala 1045	1050	1055
50	Glu Val Thr Arg Leu Val Trp Pro Leu Glu Gln His Thr Gly Ser Pro 1060	1065	1070
55	Arg Thr Glu Thr Pro Asp Arg Gly Thr Leu Ala Ala Arg Leu Ala Glu		

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	1075	1080	1085
5	Leu Ala Arg Ser Pro Glu Gly Leu Ala Gly Val Leu Leu Leu Pro Asp 1090	1095	1100
	Ser Gly Gly Ala Ala Val Ala Gly His Pro Gly Leu Asp Gln Gly Thr 1105	1110	1115 1120
10	Ala Ala Val Leu Leu Thr Ile Gln Ala Leu Thr Asp Ala Ala Val Arg 1125	1130	1135
	Ala Pro Leu Trp Val Val Thr Arg Gly Ala Val Ala Val Gly Ser Gly 1140	1145	1150
15	Glu Val Pro Cys Ala Val Gly Ala Arg Val Trp Gly Leu Gly Arg Val 1155	1160	1165
	Ala Ala Leu Glu Val Pro Val Gln Trp Gly Gly Leu Val Asp Val Ala 1170	1175	1180
20	Val Gly Ala Gly Val Arg Glu Trp Arg Arg Val Val Gly Val Val Ala 1185	1190	1195 1200
	Gly Gly Gly Glu Asp Gln Val Ala Val Arg Gly Gly Gly Val Phe Gly 1205	1210	1215
25	Arg Arg Leu Val Gly Val Gly Val Arg Gly Gly Ser Gly Val Trp Arg 1220	1225	1230
	Ala Arg Gly Cys Val Val Val Thr Gly Gly Leu Gly Gly Val Gly Gly 1235	1240	1245
30	His Val Ala Arg Trp Leu Ala Arg Ser Gly Ala Glu His Val Val Leu 1250	1255	1260
	Ala Gly Arg Arg Gly Gly Gly Val Val Gly Ala Val Glu Leu Glu Arg 1265	1270	1275 1280
	Glu Leu Val Gly Leu Gly Ala Lys Val Thr Phe Val Ser Cys Asp Val 1285	1290	1295
40	Gly Asp Arg Ala Ser Val Val Gly Leu Leu Gly Val Val Glu Gly Leu 1300	1305	1310
	Gly Val Pro Leu Arg Gly Val Phe His Ala Ala Gly Val Ala Gln Val 1315	1320	1325
45	Ser Gly Leu Gly Glu Val Ser Leu Ala Glu Ala Gly Gly Val Leu Gly 1330	1335	1340
	Gly Lys Ala Val Gly Ala Glu Leu Leu Asp Glu Leu Thr Ala Gly Val 1345	1350	1355 1360
50	Glu Leu Asp Ala Phe Val Leu Phe Ser Ser Gly Ala Gly Val Trp Gly 1365	1370	1375
	Ser Gly Gly Gln Ser Val Tyr Ala Ala Ala Asn Ala His Leu Asp Ala 1380	1385	1390
55	Leu Ala Glu Arg Arg Arg Ala Gln Gly Arg Pro Ala Thr Ser Val Ala		

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	1395	1400	1405
5	Trp Gly Pro Trp Asp Gly Asp Gly Met Gly Glu Met Ala Pro Glu Gly 1410 1415 1420		
	Tyr Phe Ala Arg His Gly Val Ala Pro Leu His Pro Glu Thr Ala Leu 1425 1430 1435 1440		
10	Thr Ala Leu His Gln Ala Ile Asp Gly Gly Glu Ala Thr Val Thr Val 1445 1450 1455		
	Ala Asp Ile Asp Trp Glu Arg Phe Ala Pro Gly Phe Thr Ala Phe Arg 1460 1465 1470		
15	Pro Ser Pro Leu Ile Ala Gly Ile Pro Ala Ala Arg Thr Ala Pro Ala 1475 1480 1485		
	Ala Gly Arg Pro Ala Glu Asp Thr Pro Thr Ala Pro Gly Leu Leu Arg 1490 1495 1500		
20	Ala Arg Pro Glu Asp Arg Pro Arg Leu Ala Leu Asp Leu Val Leu Arg 1505 1510 1515 1520		
	His Val Ala Ala Val Leu Gly His Ser Glu Asp Ala Arg Val Asp Ala 1525 1530 1535		
25	Arg Ala Pro Phe Arg Asp Leu Gly Phe Asp Ser Leu Ala Ala Val Arg 1540 1545 1550		
	Leu Arg Arg Arg Leu Ala Glu Asp Thr Gly Leu Asp Leu Pro Gly Thr 1555 1560 1565		
30	Leu Val Phe Asp His Glu Asp Pro Thr Ala Leu Ala His His Leu Ala 1570 1575 1580		
	Gly Leu Ala Asp Ala Gly Thr Pro Gly Pro Gln Glu Gly Thr Ala Arg 1585 1590 1595 1600		
35	Ala Glu Ser Gly Leu Phe Ala Ser Phe Arg Ala Ala Val Glu Gln Arg 1605 1610 1615		
	Arg Ser Ser Glu Val Val Glu Leu Met Ala Asp Leu Ala Ala Phe Arg 1620 1625 1630		
40	Pro Ala Tyr Ser Arg Gln His Pro Gly Ser Gly Arg Pro Ala Pro Val 1635 1640 1645		
45	Pro Leu Ala Thr Gly Pro Ala Thr Arg Pro Thr Leu Tyr Cys Cys Ala 1650 1655 1660		
	Gly Thr Ala Val Gly Ser Gly Pro Ala Glu Tyr Val Pro Phe Ala Glu 1665 1670 1675 1680		
50	Gly Leu Arg Gly Val Arg Glu Thr Val Ala Leu Pro Leu Ser Gly Phe 1685 1690 1695		
	Gly Asp Pro Ala Glu Pro Met Pro Ala Ser Leu Asp Ala Leu Ile Glu 1700 1705 1710		
55	Val Gln Ala Asp Val Leu Leu Glu His Thr Ala Gly Lys Pro Phe Ala		

	1715	1720	1725
5	Leu Ala Gly His Ser Ala 1730	Gly Ala Asn Ile Ala 1735	His Ala Leu Ala Ala 1740
	Arg Leu Glu Glu Arg 1745	Gly Ser Gly Pro Ala 1750	Ala Val Val Leu Met Asp 1755 1760
10	Val Tyr Arg Pro 1765	Glu Asp Pro Gly Ala 1770	Met Gly Glu Trp Arg Asp Asp 1775
	Leu Leu Ser Trp 1780	Ala Leu Glu Arg Ser Thr 1785	Val Pro Leu Glu Asp His 1790
15	Arg Leu Thr Ala Met 1795	Ala Gly Tyr Gln Arg 1800	Leu Val Leu Gly Thr Arg 1805
	Leu Thr Ala Leu Glu 1810	Ala Pro Val Leu Leu 1815	Ala Arg Ala Ser Glu Pro 1820
20	Leu Cys Ala Trp Pro 1825	Pro Ala Gly Gly Ala 1830	Arg Gly Asp Trp Arg Ser 1835 1840
	Gln Val Pro Phe 1845	Ala Arg Thr Val Ala 1850	Asp Val Pro Gly Asn His Phe 1855
25	Thr Met Leu Thr 1860	Glu His Ala Arg His 1865	Thr Ala Ser Leu Val His Glu 1870
	Trp Leu Asp Ser 1875	Leu Pro His Gln Pro 1880	Gly Pro Ala Pro Leu Thr Gly 1885
30	Gly Lys His 1890		

35

Claims

1. An isolated DNA molecule consisting of a nucleotide sequence that encodes a polypeptide wherein said polypeptide consists of a platenolide synthase domain.
2. The isolated DNA molecule of claim 1 wherein the nucleotide sequence is selected from the group consisting of: nucleotides 392 to 1603, 1922 to 2995, 3173 to 3424, 3527 to 4798, 5135 to 6208, 7043 to 7597, 7946 to 8197, 8270 to 9541, 9899 to 10909, 10985 to 11530, 12596 to 13153, 13469 to 13720, 14148 to 15422, 15789 to 16844, 16914 to 17510, 18612 to 19166, 19479 to 19730, 20215 to 21486, 21889 to 22872, 23638 to 24159, 24484 to 24678, 24742 to 26016, 26371 to 27381, 27442 to 27966, 28843 to 29892, 29905 to 30462, 30760 to 31002, 31428 to 32696, 33024 to 34022, 34770 to 35327, 35586 to 35837, 36257 to 37528, 37898 to 38905, 39851 to 40408, 40658 to 40909, and 41297 to 41395 all in SEQ ID NO: 1.
3. A polypeptide consisting of an amino acid sequence wherein said polypeptide consists of a platenolide synthase domain.
4. A polypeptide of claim 3 wherein the amino acid sequence is selected from the group consisting of:
 - (a) amino acids 15 to 418, 525 to 882, 942 to 1025, 1060 to 1483, 1596 to 1953, 2232 to 2416, 2533 to 2616, 2641 to 3064, 3184 to 3520, 3546 to 3727, 4083 to 4268, and 4374 to 4457 all in SEQ ID NO: 2;
 - (b) amino acids 35 to 459, 582 to 933, 957 to 1155, 1523 to 1707, and 1812 to 1895 all in SEQ ID NO: 3;
 - (c) amino acids 36 to 459, 594 to 921, 1177 to 1350, 1459 to 1523, 1545 to 1969, 2088 to 2424, 2445 to 2619, 2912 to 3261, 3266 to 3451, and 3551 to 3631 all in SEQ ID NO: 4;

- (d) amino acids 34 to 456, 566 to 898, 1148 to 1333, and 1420 to 1503 all in SEQ ID NO: 5; and
- (e) amino acids 35 to 458, 582 to 917, 1233 to 1418, 1502 to 1585, 1715 to 1747 all in SEQ ID NO: 6.

- 5 5. The isolated DNA molecule of claim 1 wherein the nucleotide sequence is selected from the group consisting of:
nucleotides 392 to 3424, 3527 to 8197, 8270 to 13720, 14148 to 19730, 20215 to 24678, 24742 to 31002, 31428 to 35837, and 36257 to 41395 all in SEQ ID NO: 1.
6. A polypeptide of claim 3 wherein the amino acid sequence is selected from the group consisting of:
10 (a) amino acids 15 to 1025, 1060 to 2616, and 2641 to 4457 all in SEQ ID NO: 2;
(b) amino acids 35 to 1895 in SEQ ID NO: 3;
(c) amino acids 36 to 1523, and 1545 to 3631 all in SEQ ID NO: 4;
(d) amino acids 34 to 1503 in SEQ ID NO: 5; and
15 (e) amino acids 35 to 1747 in SEQ ID NO: 6.
7. The isolated DNA molecule of claim 1 wherein the nucleotide sequence is selected from the group consisting of:
nucleotides 350 to 14002, 14046 to 20036, 20110 to 31284, 31329 to 36071, and 36155 to 41830 all in SEQ
ID NO: 1.
- 20 8. A homogenous preparation of a polypeptide having an amino acid sequence selected from the group consisting
of SEQ ID NO: 2, 3, 4, 5, and 6.
9. An isolated DNA molecule consisting of nucleotide sequence of SEQ ID NO: 1
- 25 10. A recombinant DNA vector comprising the DNA molecule of claim 1.
11. A recombinant DNA vector comprising the DNA molecule of claim 2.
12. A recombinant DNA vector comprising the DNA molecule of claim 5.
- 30 13. A recombinant DNA vector comprising the DNA molecule of claim 7.
14. A recombinant DNA vector comprising the DNA molecule of claim 9.
- 35 15. A host cell transformed with a recombinant DNA vector of Claim 10.
16. A host cell transformed with a recombinant DNA vector of Claim 11.
17. A host cell transformed with a recombinant DNA vector of Claim 12.
- 40 18. A host cell transformed with a recombinant DNA vector of Claim 13.
19. A host cell transformed with a recombinant DNA vector of Claim 14.
- 45 20. The recombinant DNA vector deposited under accession number NRRL B-21500.
21. The recombinant DNA vector deposited under accession number NRRL B-21499.

50

55

Fig. 1

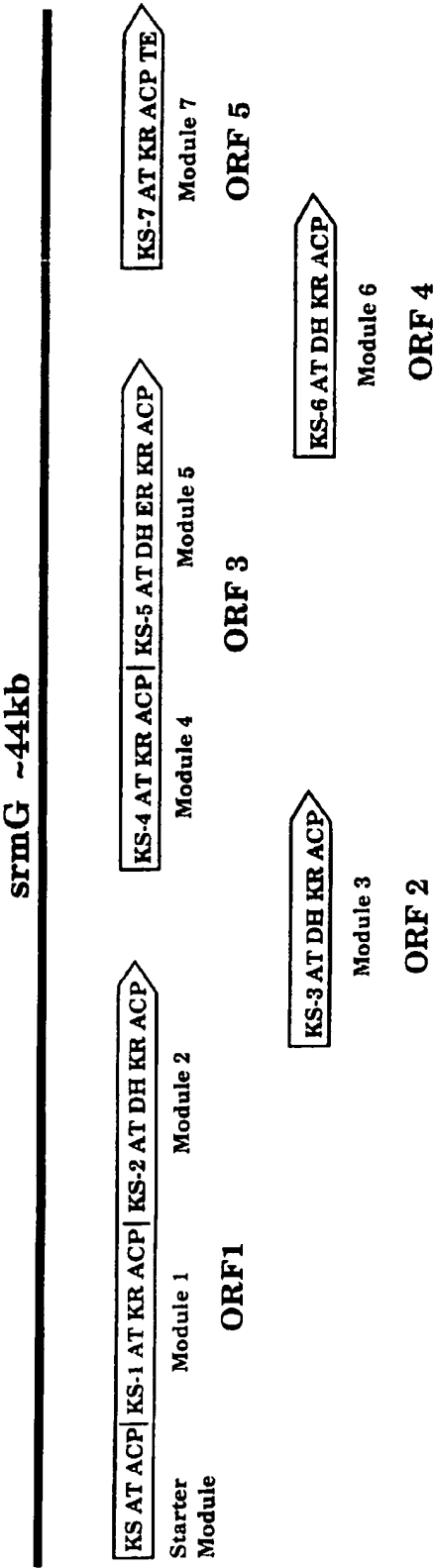


Fig. 2

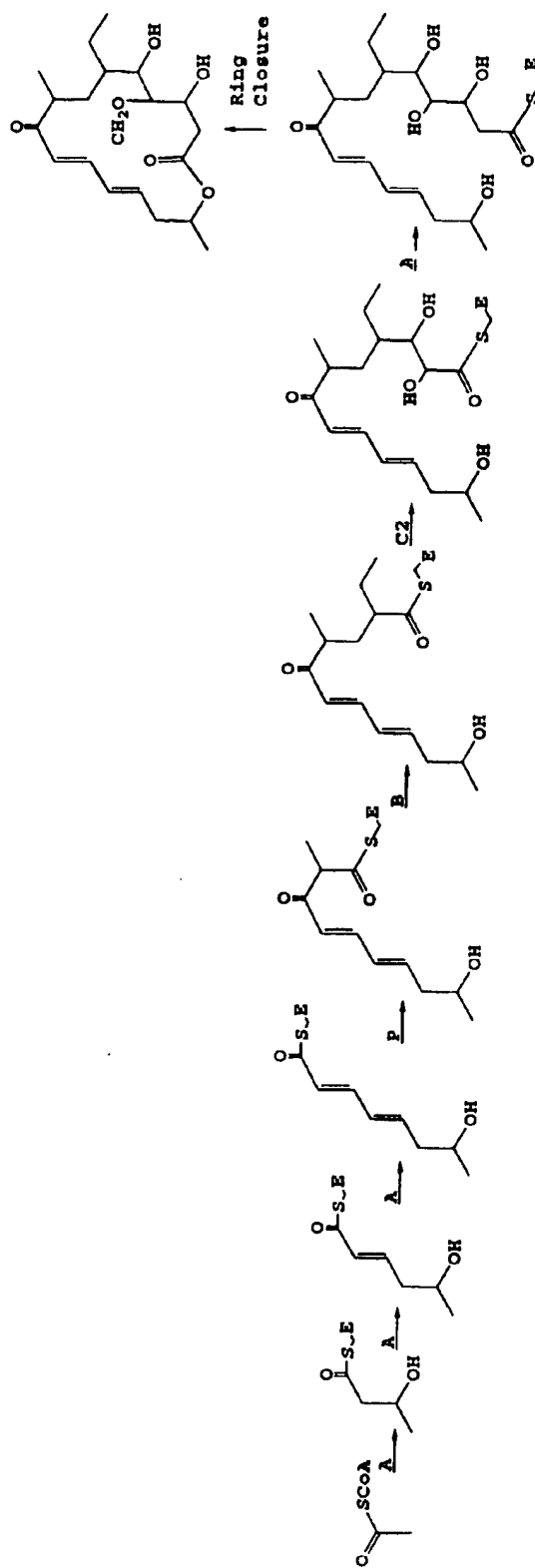


Fig. 3

